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Bibliography on Vertical Motions

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

- A. Current Abstracts in English on important meteorological literature in every language.
- B. Bibliographic references to other items of interest to the profession.
- C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 5

AUGUST, 1954

No. 8



SPECIAL FEATURE IN THIS ISSUE

A Selective Annotated Bibliography on Vertical Motions

(For complete table of contents see back cover)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of important references on a special subject. No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues of Vol. 1, 1950 were:

1) Atmospheric Pollution, 2) Aerobiology, 3) Cloud Physics, 4) Hail, 5) Tornadoes, 6) Volcanic Eruption, 7) Climatic Changes, 8) Thunderstorms, 9) Icing, 10) Acoustical Propagation and 11) Evaporation.

Those published in Vol. II, 1951 were:

1) Extended Forecasting, 2) Long Range Forecasting, 3) Soil Temperature, 4) Constants, Tables, etc., 5) Climate of Near East, 6) Climate of Middle East, 7) Special Winds, 8) Radar Storm Detection, 9) Condensation Trails, 10) Climate of Northeast Africa and 11) Mountain Meteorology.

Other bibliographies previously published were:

No.	Mo.	Vol. III, 1952	Vol. IV, 1953
1.	Jan.	Climate—Northwest Africa	Turbulence Theory
2.	Feb.	Carbon Dioxide	Turbulent Diffusion and Exchange
3.	March	Climate—Argentina, etc.	Frost and Frost Forecasting
4.	April	Dew	Climate of Australia and New Zealand
5.	May	Objective Forecasting	High Level Winds (500–100 mb)
6.	June	Stratus Forecasting	High Level Winds (above 100 mb)
7.	July	Urban Climatology	Jet Stream
8.	Aug.	Climate—Central Africa	Radiation Bioclimatology
9.	Sept.	Visibility	Climatology of the Pacific
10.	Oct.	Glaze and Rime	Auroras
11.	Nov.	Free Air Turbulence	Sferics

Bibliographies published this year are:

1. General Oceanographic Meteorology, Vol. V, No. 1, Jan. 1954
2. Climate of Southeast Asia and Netherlands Indies, Vol. V, No. 2, Feb. 1954
3. Physics of Auroras, Vol. 5, No. 3, March 1954
4. Tropopause, Vol. 5, No. 4, April 1954
5. Balloons, Vol. 5, No. 5, May 1954
6. Numerical Forecasting, Vol. 5, No. 6, June 1954
7. Radiation Data, Vol. 5, No. 7, July 1954
8. Vertical Motion, Vol. 5, No. 8, Aug. 1954

Forthcoming bibliographies will be:

9. Climatology of the Arctic Basin, Vol. 5, No. 9, Sept. 1954
10. Industrial Meteorology, Vol. 5, No. 10, Oct. 1954

Other bibliographies in preparation are:

<i>Actinometers</i>	<i>Night Airglow</i>
<i>Arctic Synoptic Meteorology</i>	<i>Ozone</i>
<i>Climate of the Arctic</i>	<i>Singularities</i>
<i>Cosmic Rays in the Atmosphere</i>	<i>Snow Cover</i>
<i>Energy Exchange, Sea-Air</i>	<i>Synoptic Aerology</i>
<i>Fog Forecasting</i>	<i>Tropical Cyclones</i>
<i>Microwave Propagation</i>	<i>Wind Waves and Currents</i>

Part III contains a listing of the contents of those journals which are primarily meteorological. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the December issue cumulative author, subject, geographical and journal indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory (and American Meteorological Society) Library, Milton, Mass.

Other symbols:

- * before an entry indicates a good data source.
- † before an entry indicates a good bibliography.
- ! before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. The entry will read as follows:

Meteorologische Rundschau, 2(5/6):146-151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, Jahrgang 2, 1950, Heft 5/6 (No. 5/6), pages 146-151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

WORKS OF SPECIAL INTEREST

5.8-1

551.551:533.6

Benton, George S., **The occurrence of critical flow and hydraulic jumps in a multi-layered fluid system.** *Journal of Meteorology*, 11(2):139-150, April 1954. 3 figs., 3 refs., 57 eqs. **MH-BH**—With use of the speed of long waves of infinitesimal amplitude as the criterion for critical flow, general expressions are obtained for critical conditions in a fluid system of n layers, where velocity as well as density vary from layer to layer. It is shown that at critical flow, energy per unit volume in each layer, total energy transfer, and total momentum transfer are all minima. The multi-layered system is in this respect a simple extension of the one-fluid regime, since the fluid system cannot pass through critical flow in steady state over a horizontal surface without occurrence of a finite surface or internal hydraulic jump. These principles are illustrated by a detailed analysis of a two-layer system, and it is shown that momentum and energy considerations are insufficient to specify conditions below a standing hydraulic jump when all upstream parameters are known. The implications of this concept are discussed in connection with the changes a real two-fluid system will undergo when momentum and energy are abstracted by friction. *Subject Heading: 1. Wind structure.—Author's abstract.*

5.8-2

551.515.2

†Bergeron, T., **The problem of tropical hurricanes. Reviews of modern meteorology—12.** *Royal Meteorological Society, Quarterly Journal*, 80(344):131-164, April 1954. 20 figs., 55 refs. **MH-BH**—Author outlines his convective theory (1928) of generation of hurricanes at tropical front (defined in a footnote). Conditions are air temperature of at least 27°C, a suitable temperature lapse to provide lability energy and a pre-existing moderate cyclonic vortex. A schematic plan and section shows "eye" and concentric zones of updraft, slight rain, maximum wind and torrential rain. This is illustrated by hurricane of Sept. 18-21, 1947, with maps of rainfall, hourly and total, and Oct. 5-8, 1941, and contrasted with thunderstorm and "pseudo-cold front" development over land. Source of rainfall is analyzed quantitatively, giving about 15.5×10^9 ton/day; observed amount somewhat less. Development from tropical low over warm sea is examined; similar intense extratropical cyclones are illustrated by examples from Baltic. Decay of a hurricane over land is interpreted as the acquisition of a cold core with an outer ring of falling pressure. *Subject Headings: 1. Hurricanes 2. Reviews —C.E.P.B.*

5.8-3

551.594.21

Gunn, Ross, **Electric-field regeneration in thunderstorms.** *Journal of Meteorology*, 11(2):130-138, April 1954. 4 figs., table, 12 refs., 16 eqs. **MH-BH**—Records of field intensity on the ground near active thunderstorms are shown. In the usual type a positive field up to about 100 v/cm is gradually induced, interrupted at intervals of 2-20 sec by lightning flashes within the cloud. After 4-10 small reductions of the field there is often (at about one min intervals) a large change reversing the field. The two types of flash can be distinguished visually. A few storms induced a negative charge on the earth, similarly interrupted or reversed; some storms were of mixed type. The small discontinuities are attributed to regeneration (about 3.5 v/cm/sec) by falling rain raising the field to the critical breakdown field for air. The large changes are due to the time required to distribute free charge through the cloud by conduction. Calculations and measurements inside an active thunder cloud show that the process is of the right magnitude. *Subject Heading: 1. Thunderstorm electricity.—C.E.P.B.*

5.8-4

551.515.4:551.509.5(02)

551.515

†*§Kolobkov, N. V., **Grozy i shkvaly**. [Thunderstorms and squalls.] Moscow, Gos. Izda. 1951. [2nd ed.] 355 p. 148 figs., 31 tables, 155 refs. **DLC**—A popular rendition of the work appeared under the title "Grozy i buri" (Thunderstorms and other storms) in two editions: 1949 and 1951 (see item 3.10-137, Oct. 1952, *MAB*). The first full edition which appeared in 1940 (see items E-75 and H-83, May, Aug. 1950, *MAB*) was the most complete scientific work on thunderstorms and tornadoes to date. The present edition contains numerous additions and revisions both in text (and illustrations) and bibliography up to 1951. The text is divided into 3 main parts: I. Thunderstorms, atmospheric electricity, lightning, hail, cloud physics; II. Thundersqualls (warm front, cold fronts, tornadoes, water spouts, dust and sand storms); III. Synoptic and aerological aspects of thunderstorms, thermodynamics, flight through thundersqualls and forecasting same. The bibliography is very complete, containing 123 references to Soviet literature and 33 to Western treatises. The emphasis in the forecasting section is placed on recent developments in upper air synoptic methodology such as charts of relative and absolute topography supplemented by sferics recording and location methods, the use of thermodynamic charts and cross sections, moisture content analysis, as well as by cloud observation. The book is well worth translating into English. The chapter on tornadoes is illustrated by photos of tornadoes in the U.S.A. and the U.S.S.R. and of damage to trees and structures, drawings of paths of tornadoes and synoptic charts during tornado occurrence. *Subject Headings*: 1. Thunderstorms 2. Squalls 3. Thunderstorm forecasting 4. Tornadoes 5. Textbooks 6. U.S.S.R.—*M.R.*

5.8-5

521

†*Kuiper, Gerard Peter (ed.), **The sun**. Chicago, Univ. of Chicago Press, 1953. 745 numerous figs. (incl. photos), tables, eqs. Bibliogs. at end of most chapters or sections. **DWB**—This is Vol. 1 of a projected series of four volumes on "The Solar System." The second volume will be on the "Earth as a Planet," the third on "Planets and Comets." The present volume contains the following chapters: I. Introduction, by LEO GOLDBERG (historical solar constants, solar physics, solar terrestrial relationships, solar atmosphere); II. The sun as a star, by BENGT STRÖMGREN; III. The photosphere, by M. MINNAERT; IV. The identification of solar lines, by CHARLOTTE E. MOORE; V. The chromosphere and the corona, by H. C. VAN DE HULST; VI. Solar activity, by K. O. KIEPENHEUR; VII. Solar radio emission, by J. J. PAWSEY and S. F. SMERD; VIII. Solar electro-dynamics, by T. G. COWLING; Empirical problems and equipment, by C. WALLEN, P. C. KUNAN, R. R. McMATH, J. W. EVANS, W. ROBERTS, R. TOUSEY, J. G. WILD, H. W. DODSON, A. EHMERT, J. A. SIMPSON and others. The entire range of subjects in the field of astrophysics is included: for instance measurements of solar constant, the zodiacal light, ionosphere during eclipses, rocket observations of extreme UV and X-rays, radio frequency radiation from sun, solar flares, 200 cm/sec radiating cosmic rays from sun, Alvin's theory of magnetic field in sunspots, corpuscular streams, auroras; and of course historical and bibliographic material, tables of constants, etc. *Subject Headings*: 1. Solar physics 2. Solar radio emissions 3. Cosmic radiation 4. Astrophysics 5. Compendiums 6. Textbooks.—*M.R.*

5.8-6

551.571

Marshall, J. S. and Langleben, M. P., **A theory of snow-crystal habit and growth**. *Journal of Meteorology*, 11(2):104-120, April 1954. 22 figs., 3 tables, 24 refs., 19 eqs. Also in: *Mem. Univ. McDonald Physics Lab.*, Contract AF 19(122)-217, Scientific Report MW-9, 1953. **MH-BH, DWB**—Experimental observations of U. NAKAYA on formation of different types of ice crystal at different temperatures are examined by plotting against density excess $\Delta\rho$ and temperature and by a discussion of processes of convection and diffusion-conduction. Maximum $\Delta\rho$ occurs at about -15°C . The vapor density field around a disk is shown to favor growth at edges and especially corners of a hexagonal plate, but growth of dendrites is inhibited until the excess vapor density suffices to overcome curvature effect. An analogous electrolytic tank experiment is described. Lines of constant vapor density favoring columnar, plate and dendritic growth are calculated; it is concluded that distribution of snow crystal types as a function of temperature is due to excess of ambient vapor pressure over that at surface of growing ice crystal, somewhat modified by the presence of small water droplets.

Subject Headings: 1. Snow crystals 2. Ice crystal growth. I. Nakaya, U. II. McGill Univ. McDonald Physics Lab. III. Contract AF19(122)-217.—C.E.P.B.

5.8-7

551.594.2:551.574.42

†Mason, B. J. (*Imperial College, London*), **A critical examination of theories of charge generation in thunderstorm.** *Tellus*, Stockholm, 5(4):446-460, Nov. 1953. refs. p. 460. **MH-BH**—Observational data obtained by BYERS et al. (Thunderstorm Project), WORKMAN (Albuquerque, N. Mex.), KUETTNER (Zugspitze), MALAN and SCHONLAND (South Africa), SIMPSON and SCRASE (Kew) and others are analyzed to show the general physical characteristics of thunderclouds, especially the relation between electrical charges and active cells or bubbles (SCORER) and temperature, freezing level, vertical currents, etc. The most important observation was that of KUETTNER (1950) that graupel was present on 75% of occasions of thunderstorms at Zugspitze (10,000 ft). Theories of charge generation and separation of ELSTER and GEITEL (1913), collision theory, WILSON's selective ion capture theory (1929), WALL's ice crystal theory (1948), FRENKEL's molecular dipole theory (1947) and the drop breaking theories of LENARD (1892), SIMPSON (1909) and CHAPMAN (1952), SIMPSON's (1942) theory of charging by collision of ice crystals, DINGER and GUNN's (1946) theory of release of air bubbles from melting ice; WORKMAN and REYNOLD's (1950) theory of freezing effects and, finally, the author's idea that charges are acquired during the formation of rime or graupel pellets—supported by work of FINDEISEN (1943), KRAMER (1948), LAUDER (1951), MEINHOLD (1951) and WEICKMANN and AUFM KAMPE (1950). Objections to all of the former theories are based mainly on quantitative grounds. The graupel or rime theory seems to be the most acceptable, but needs further quantitative proof. *Subject Headings:* 1. Thunderstorm electricity 2. Charge generation in thunderclouds 3. Graupel in clouds—M.R.

5.8-8

551.5(02)

*†Riehl, Herbert (*Dept. of Met., Chic. Univ.*), **Tropical meteorology.** N. Y., McGraw-Hill, 1954. 392 p. tables, numerous figs., extensive bibliog. at end of each chapter. **DLC**—This unique textbook is the outgrowth of the author's experience in tropical meteorology which began in 1943 at the Institute of Tropical Meteorology at San Juan, Puerto Rico, and grew with the publication of in-service training courses for the Air Force. The present work is new and nicely edited with numerous references, a subject and author index and scores of schematic and other types of diagrams. The 12 chapters are entitled: 1) Winds and pressure, 2) Temperature, 3) Rainfall, 4) Diurnal and local effects, 5) Convection, 6) Physics of tropical rain (by R. WEXLER), 7) Weather observation and analysis, 8) Divergence and vorticity, 9) Waves in easterlies, 10) Low latitude disturbances, 11) Tropical storms and 12) General circulation. The subjects of rain from non-freezing clouds and waves in the easterlies are particularly important and are treated in detail. Mathematics is avoided as much as possible, though in treating subjects like vorticity and divergence it cannot be eliminated. *Subject Headings:* 1. Tropical meteorology 2. Textbooks.—M.R.

5.8-9

551.578.11

Sartor, Doyné, **A laboratory investigation of collision efficiencies, coalescence and electrical charging of simulated cloud droplets.** *Journal of Meteorology*, 11(2):91-103, April 1954. 8 figs., 4 tables, 16 refs., 9 eqs. **MH-BH**—Reynolds numbers are calculated for drops of 5-50 μ . Drops of distilled water of sizes to give these Reynolds numbers fell through a tank of mineral oil and relative trajectories of large and small drops were plotted. Most of the runs resulted in collision but not coalescence, collision efficiency being 2-3 times that given by LANGMUIR's theory, because large drops tended to follow wakes of smaller drops. When an electric field was applied, drops coalesced with frequencies increasing with field strength up to 250 v/cm (100% coalescence). Relative positions of drops on coalescence depended on strength of field. Coalescence was due to redistribution of charges on the two drops. The process is analyzed and shown to agree qualitatively with observations of charge distribution in thunderstorms. *Subject Heading:* 1. Raindrop coalescence.—C.E.P.B.

5.8-10

551.586(02)

Seybold, A. and Woltereck, H. (ed.), **Klima-Wetter-Mensch.** [Climate, weather and man.] 2nd revised ed. Heidelberg, Quelle & Meyer, 1952. 293 p. figs., tables, refs.

DWB—Since the first edition of this systematic review of literature and knowledge on various phases of bioclimatology came out in 1938, one of the authors, **RICHARD HESSE**, has died and his chapter on climate, weather and animal life has been taken over by **W. TISCHLER** of Kiel Univ. Other chapters as listed below have been revised or rewritten, with omission of illustrative material. The first part on the "Basis of climate and weather science" by **L. WEICKMANN** and **H. UNGEHEUER**, gives a concise review of atmospheric structure, physics, radiation balance, temperature, convection, Austausch, synoptic meteorology, weather services, networks, charts, forecasts, etc. and climatic (micro and macro-) factors in relation to humans, plants and animals. The second part by **B. DE RUDDER**, is concerned with the Basis of Human Bioclimatology. He takes up the various climatic elements (radiation, temperature, humidity, pressure, wind, oxygen, ionization and radioactivity from the ground) the various types of climate (tropical, arctic, mountain, ocean) and the seasons, regular and irregular changes of weather and climate in relation to man. The chapter by **PFLEIDERER** and **SCHITTENHELM** takes up climate as a means of helping to cure diseases or to keep people healthy. The part by **MARTINI** is concerned with climate and disease; **SEYBOLD**'s chapter is on "Plants, Climate and Weather" and the one by **TISCHLER** on animal climatology. The final chapter by **HELLPACH** is on the old subject of "Climate and Kultur." The entire work maintains a high critical level, and in most of the chapters the arguments are supported by ample statistics (both tabular and graphic) material. The initial chapters would not offend even the most critical synoptic meteorologist, and the remainder of the book is more in the nature of a review of progress in these interrelated fields, rather than an original contribution to each subject. *Subject Headings:* 1. Bioclimatology 2. Biometeorology 3. Textbooks 4. Literature reviews. **I. Weickmann, L. II. Ungeheuer, H. III. De Rudder, B. IV. Pfeiderer, H. V. Schnittenhelm, A. VI. Martini, E. VIII. Tischler, W. VIII. Hellpach, W.—M.R.**

GENERAL METEOROLOGY

See also: Tropical met. (Riehl), 5.8-8; Climatology and its relation to met. and physical geography (Okolowicz), 5.8-227.

5.8-11

5(023) 551.5(023)

Kaempffert, Waldemar, Explorations in science. London, Victor Gollancz, 1953. 288 pp. Chap. 3, "This most excellent canopy, the air," p. 47-53; Chap. 4, "Doing something about the weather," p. 54-68. **GB-MO**—Chap. 3 gives a popular account of the troposphere, stratosphere, ozone layer, ionosphere and outermost regions. Chap. 4 describes fronts, principles of rainmaking, use of electronic computers and atmospheric models in forecasting, and version of hurricanes. Other chapters discuss "Power from the sun" and cycles, including solar and weather cycles. *Subject Heading:* 1. Popular science books.—*C.E.P.B.*

5.8-12

551.5(023)

Tannehill, Ivan Ray, All about the weather. New York, Random House, 1953. 148 pp. **Rene Martin, illustrator. DLC**—This most recent and competent book on weather is one of a series of five "All about" books published by Random House for the ever increasing number of young people (9-12) who are at the age when developing interests may lead them into future careers along the lines of those interests. The introduction by **F. W. REICHELDERFER** testifies not only to the national and world-wide reputation of the author (who wrote more technical books on Hurricanes, Drought, Climate of the World, etc.) but to the accuracy and richness of the information contained in this simple presentation. The illustrations done in half-tones are attractive and imaginative, and the text worth reading, for the sake of perspective even by a professional meteorologist. The subject matter ranges from storm forecasting, atmospheric structure, composition, weather elements and hydrometeors to methods of observation, research on high atmosphere, synoptic forecasting, services provided by meteorology at various places and, finally, the services of cooperative observers in accumulating climate records for thousands of places, and the use of these records. Modern observation methods such as radar storm or hurricane detection, airplane reconnaissance, ocean weather ships, and applications such as to industry or stratosphere flying are covered and illustrated. *Subject Headings:* 1. Popular meteorology books **I. Reichelderfer, F. W. II. Martin, Rene (illustrator)—M.R.**

5.8-13

551.5(05)

Earth and Air, a Monthly Science Journal Especially Devoted to Meteorology. Pennan; Rochester; Dannsville, New York, v. 1, No. 1, Sept. 1900; last issue received v. 2, No. 1/2, March/April 1901. Format changes with v. 2. illus. No more published? **DWB, DLC**—this popular journal, while it lasted, served the same purpose as *Tycos* (also published in Rochester, N. Y.) or *Weatherwise* published by the Amateur Weathermen of America since Feb. 1948. Articles by WILLIS L. MOORE, Chief of the U. S. Weather Bureau, J. WARREN SMITH, and other noted meteorologists on subjects of interest to forecasters and cooperative or other observers and to those interested in agriculture teaching, shipping, history, cloud photography, etc. *Subject Headings:* 1. Periodicals 2. Amateur meteorologists 3. Earth and Air.—*M.R.*

5.8-14

551.5:06

International Union of Geodesy and Geophysics, Association of Meteorology, Brussels, 1951, Actes de l'Association. publ. 1952. 84 p. In English or French. **DWB**—Detailed transactions of various sessions of the I.U.G.G. Association of Meteorology and of Joint Meetings and Joint Commissions or Sub-Commissions such as that on Radiation, on the International Polar Year, Hydrology, Radio Meteorology, Atmospheric Ozone, Upper Air Nomenclature, etc. during the Brussels meeting of Aug. 23-31, 1951. *Subject Headings:* 1. I.U.G.G. Transactions—Brussels, 1951 2. I.U.G.G. Conference Reports 3. Conferences.—*M.R.*

5.8-15

551.5.06

World Meteorological Organization. *Meteorological Magazine*, London, 83(982):97-100, April 1954. photo. **MH-BH**—Accounts of: Combined meeting of Commissions for Instruments and Methods of Observation and for Aerology, Toronto, Aug. 10-Sept. 5, 1953, (photo) and Commission for Bibliography and Publications, Paris, Nov. 24-Dec. 12, 1953. *Subject Heading:* 1. World Meteorological Organization.—*C.E.P.B.*

5.8-16

551.5:519.272

Dedebant, G.; di Maio, R. and Machado, E. A. M., **Los números aleatorios y su aplicación a la meteorológica.** [Stochastic numbers and their application to meteorology.] *Meteoros*, Buenos Aires, 3(1):31-53, Jan./March, 1953. 7 figs., 2 tables. Spanish and French summaries p. 31. **DWB**—A brief theoretical exposition of the principles of stochastic processes with special reference to their practical application is presented. The discussion includes stochastic numbers and functions, algebraic and vectorial, covariance, correlation coefficient, weakly stochastic numbers, etc. The application of stochastic processes to a study of the vertical structure of the atmosphere in temperate latitudes using atmospheric soundings is illustrated; the examples are concerned with the barotropic law. *Subject Headings:* 1. Stochastic numbers 2. Atmospheric structure.—*I.L.D.*

5.8-17

551.5:616:519.2

Jessel, U., **Bemerkungen zur medizin-meteorologischen Statistik.** [Remarks on medical meteorological statistics.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 17-20, 1953. 2 figs., 28 refs., eqs. **MH-BH**—Author criticizes some of the statistical methods used in recent meteorological research. He deals with probabilities of 0, 1, . . . occurrences computed from Bernouille's law, comparison of frequencies, testing significance of relations found by the *n*-method, methodology of overlapping group formation (running means), coincidence of biological and meteorological phenomena and resulting spurious correlations. Each section is illustrated by examples drawn from the literature. The statistical basis of many commonly believed relations between weather and disease is insufficient. *Subject Headings:* 1. Statistical analysis 2. Medical meteorology.—*C.E.P.B.*

5.8-18

551.5:63

Some applications of meteorology to agriculture. *Meteorological Magazine*, London, 83(983):147-149, 1954. 5 refs. **DWB**—Discussion was opened by L. P. SMITH of Agricultural Meteorological Branch. He described work of the Branch on potato blight forecasting, frost

avoidance, wind shelter and irrigation. A good discussion is briefly summarized. *Subject Headings: 1. Agricultural meteorology. I. Smith, L. P.—C.E.P.B.*

5.8-19

551.5:63(0)

†Kessler, Otto Wilhelm, *Wetterkunde für Gärtner, Weinbauern und Landwirte*. [Meteorology for the gardener, winegrower and farmer.] 2d ed. rev. by Wolfgang Kaempfer. Stuttgart, Eugen Ulmer, 1948. 83 p. 14 tables, 46 figs. *Grundlagen und Fortschritte Garten- und Weinbau*, No. 13. **DLC**—This moderately technical presentation of the principles of meteorology and its practical application to agriculture consists of the following sections: The composition of the atmosphere; solar radiation and heat exchange including radiative balance; diurnal and nocturnal heat exchange; influence of soil and snow cover upon heat exchange, etc.; the properties of the individual meteorological variables and their interaction in the formation of weather; the origin of weather and weather forecasting including characteristics and behavior of air masses and fronts; long range forecasting; weather probes and local forecasting; description of the various weather instruments and directions for their use; the operation of a weather observatory by the farmer including types of observations to be made; their recording and interpretation; the role of climate in agriculture—large scale microclimatology and phenology; and weather damage, especially frost injury and its prevention. The appendix contains a nomogram for determining relative humidity and a general bibliography. The book is richly illustrated with diagrams and photographs and contains numerous graphs and tables. *Subject Headings: 1. Agricultural meteorology 2. Popular meteorology 3. Bibliographies. I. Kaempfer, Wolfgang (ed.).—I.L.D.*

5.8-20

551.5

Director of the Meteorological Office. *Meteorological Magazine, London*, 82 (976):289-290, Oct. 1953. photo. **DWB.** Also: **The retirement of Sir Nelson K. Johnson, K.C.B., D.Sc.** *Marine Observer*, 23 (162):191-192, Oct. 1953. photo. **MH-BH**—**SIR N. JOHNSON** retired Sept. 1, 1953. Joined Meteorological Office 1919 and formed meteorological section of the Office Chemical Research Establishment at Porton 1921, later becoming Chief Superintendent, Chemical Research Department. Returned to Meteorological Office as Director in 1928. *Subject Headings: 1. Biography 2. Johnson, Sir Nelson.—C.E.P.B.*

5.8-21

551.1

Gold, E., Obituary. Sir Nelson Johnson. *Weather*, 9 (4):116-117, April 1954. Also: *Nature*, London, 173 (4480):754-755, April 24, 1954. **DWB**—Born March 11, 1892 at Cambridge, died March 23, 1954. Educated Royal College of Science, then assistant to Sir R. LOCKYER. Joined Royal Flying Corps and at end of the 1914-18 war entered Meteorological Office. In 1928 became Director of experiments at Chemical Defense Research Establishment, and later Chief Superintendent. Account given of comprehensive investigation of temperature gradient up to 300 ft and of Directorship of Meteorological Office, including establishment of Meteorological Research Committee and Meteorological Research Flight and section for forecasting research. As Chairman of International Meteorological Commission guided change to World Meteorological Organization. *Subject Headings: 1. Obituary 2. Johnson, Sir Nelson.—C.E.P.B.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: Relation between directly measured solar radiation and global radiation (Hartmann), 5.8-127; Probable annual rainfall, Algeria (Seltzer), 5.8-203; Initiation of showers by snow (Dennis); Current status of climatology (Pogosian), 5.8-228.

5.8-22

551.501:551.578.46 (471.1) 551.5

Angervo, J. M., *Snöundersökningar i Finland*. [Snow research in Finland.] *Tidsskrift*, Stockholm, 81 (3):747-749, Sept. 22, 1951. 4 figs., 3 tables. **DLC**—The research involved the development of a snow gauge and an instrument to measure hardness of the snow.

Both instruments are described. The Finnish system of snow classification is tabulated and explained. The results of the first two years of snow cover investigations (1948/49-1950/51) are presented in tables and discussed. It is shown that snow differs in shape, structure, density and hardness in various parts of the country and with individual snow cover. *Subject Headings: 1. Snow gages 2. Snow cover research 3. Finland.—W.N.*

5.8-23

551.501:551.578.11:629.13

Brun, Rinaldo J., Gallagher, Helen M. and Vogt, Dorothea E. (*Lewis Flight Propulsion Lab., Cleveland, Ohio*), **Impingement of water droplets on NACA 65A004 airfoil and effect of change in airfoil thickness from 12 to 4 percent at 4° angle of attack.** *NACA. Technical Note*, 3047, Nov. 1953. 45 p. diags., tables. **DLC**—The trajectories of droplets in the air flowing past an NACA 65A004 airfoil at an angle of attack of 4° were determined. The amount of water in droplet form impinging on the airfoil, the area of droplet impingement, and the rate of droplet impingement per unit area on the airfoil surface were calculated from the trajectories and presented to cover a large range of flights and atmospheric conditions. The effect of a change in airfoil thickness from 12 to 4 percent at 4° angle of attack is presented by comparing the impingement calculations for the NACA 65A004 airfoil with those for the NACA 65-208 and 65-212 airfoils. The rearward limit of impingement on the upper surface decreases as the airfoil thickness decreases. The rearward limit of impingement on the lower surface increases with a decrease in airfoil thickness. The total water intercepted decreases as the airfoil thickness is decreased. *Subject Headings: 1. Impingement of drops 2. Drop impingement measurement 3. Drop impingement on airfoil.—Authors' abstract.*

5.8-24

551.501:551.526

Hammecke, K. and Kappler, E. (*Physik. Inst., Münster Univ.*), **Eine neue Methode zur Bestimmung der Oberflächentemperatur des Wassers bei Verdampfungsversuchen.** [A new method for measuring water surface temperature during evaporation experiments.] *Zeitschrift für Geophysik*, Sonderband, p. 181-185, 1953. 4 figs., eqs., 3 refs. **DWB**—A thin border layer with a sharp temperature gradient exists within the water at the surface during evaporation, so that the actual surface temperature cannot be measured even by a thermometer. The author developed a device whereby the temperature is measured pyrometrically with an accuracy of 0.05°C by the radiation from the surface. The computation of the true surface temperature from the measured value, which is representative for a layer of about 0.01-² mm, is explained. A sketch of the equipment is shown and the determination of the condensation coefficient discussed. *Subject Headings: 1. Water surface temperature measurement 2. Evaporation 3. Laboratory experiments.—A.A.*

5.8-25

551.501:551.557:551.510.535

Manning, Laurence A. (*Stanford Univ., Calif.*), **Recent advances in the study of ionospheric winds.** *American Meteorological Society, Bulletin*, 34(9):401-405, Nov. 1953. 6 figs., 4 refs. **MH-BH**—Two radio methods of ionospheric wind observation and the meteoric method are described in detail and illustrated. *Subject Headings: 1. Ionospheric wind measurement 2. Radio wind measurement 3. Meteoric drift measurement.—M.R.*

5.8-26

551.501:551.551

Paulus, R., **Ein Hilfsmittel für kleinklimatische Beobachtungen.** [An aid to microclimatic observations.] *Meteorologische Rundschau*, 7(1/2):22, Jan./Feb. 1954. **DWB**—Author suggests blowing soap bubbles as a method of following microclimatic wind currents, showing paths round obstacles and also turbulence. *Subject Headings: 1. Microclimatic wind observation 2. Turbulence observation.—C.E.P.B.*

5.8-27

551.501.4:551.571

Duclaux, Jean P. E., **Méthode de calcul de la tension de vapeur de l'eau entre 0 et 100°C.** [Method of calculating water vapor pressure between 0° and 100°C.] *Académie des Sciences, Paris, Comptes Rendus*, 236(21):2041-2043, May 27, 1953. **DWB**—The usual tables giving the dependence of the saturated water pressure on temperature are an adjustment of different

experimental results (for example the "Wärmetabellen," Braunschweig 1919). The author develops a rather simple formula from Clapeyron's relationship, which permits a satisfactory computation of the vapor pressure. *Subject Headings:* 1. Vapor pressure calculations 2. Clapeyron's equation.—A.A.

5.8-28

551.501.4:551.55(2)

Petri, O., *Ein neuer Windrechner für Bordgebrauch*. [A new wind calculator for use aboard ships.] *Annalen der Meteorologie*, 6(1/2):57-60, 1953/54. 2 figs., 5 refs. MH-BE—The apparatus, designed at the Dept. of Maritime Meteorology at Seewetteramt, Hamburg enables true wind to be read off from apparent wind and speed of ship by means of two circular scales and pointers which solve the parallelogram of velocities. *Subject Headings:* 1. Wind computation at sea 2. Wind computers.—C.E.P.B.

5.8-29

551.501.42:551.1

Ball, J. D. W., *Tables of barometric pressures at varying temperatures*. London, Cassell & Co., 1953. 24 p. GB-MO—Equivalents of mm. Hg at temperatures from 0° to 40°C in Kg/cm², and of inches Hg for same temperature range in lb/ft² and lb/in² are tabulated. Subsidiary tables convert Kg/cm² to bars at standard gravity and at Greenwich gravity. *Subject Heading:* 1. Conversion tables.—C.E.P.B.

5.8-30

551.501.6:551.5

Saucier, Walter J. and Elliott, William P., *A new tephigram*. Texas. Agricultural and Mechanical College. Dept. of Oceanography, Contract AF 19(604)-559, Scientific Report No. 1, Sept. 1953. 25 p. figs., tables, 10 refs., eqs. DWB—This new tephigram which is particularly suitable for work concentrating in the region between 500 and 50 mb is based upon new values for the physical constants R_d and C_p (specific gas constant for dry air and specific heat of dry air at constant pressure) so that R_d/C_p is 2/7 instead of 0.288, and it is on a sufficiently large scale to be useful for ordinary needs (temperature scale—minimum of 2 m per °C temperature range -90 to +40°C for pressure range 1000 mb to 50 mb). The construction of the chart including a description of its grid, the adiabatic change of state, thermodynamic processes involving the behavior of water in the vapor and liquid phases: the mixture of air and saturated water vapor at the condensation stage; the computation of pseudo-adiabats from VON BEZOLD's equation and from ROSSBY's approximate pseudo-adiabatic equation and the meaning of the thermodynamic quantities θ_E and θ_W are discussed. The appendix contains tables of Rossby θ_E in °K for given values of: 1) pressure and temperature at saturation, 2) of temperature and temperature dew point depression, and a reproduction of the constructed tephigrams. *Subject Headings:* 1. Tephigrams 2. Adiabatic charts I. Texas. Agricultural and Mechanical College. Dept. of Oceanography II. Contract AF 19(604)-559.—I.L.D.

5.8-31

551.501.7:551.5

*Sinz, Heinz, *Die vertikale Energieverteilung in der Atmosphäre sowie Versuch einer energetischen Luftmassendiagnose*. [The vertical energy distribution in the atmosphere and an attempt at an air mass analysis on the basis of the energy.] *Leipzig. Universitäts-Physikalisches Institut, Veröffentlichungen*, Ser. 2, 16(3):371-424, 1953. 14 figs. (1 for 4 tables, 21 refs. DWB—The author attempts to apply the Sonntag (see item 5.8-32 below) energy (H) diagram analysis to synoptic and aerological analysis of European weather. climatological variations in H (diurnal, interdiurnal, annual, seasonal, regional and horizontal distribution of energy, in Joules/g, and energy gradient $\Delta H/dh$) and the contrast between troposphere where H is almost constant with height, and the stratosphere, where (because of decreasing water vapor) the energy increases rapidly, are shown vividly in diagrams. A new and rational definition of the tropopause and a classification of tropopause types are possible. Frequency of energy values in different air masses and seasons is analyzed. An application made to the air mass types of SCHERHAG, showing that this H analysis clearly differentiates air masses. *Subject Headings:* 1. Energy diagrams 2. Etagram analysis 3. Tropopause types 4. Air mass analysis. I. Sonntag, Dietrich.—M.R.

5.8-32

551.501.7:551.515.8

Sonntag, Dietrich, *Der Energieinhalt von Luftmassen und dessen Bestimmung aus aerologischen Aufstiegen*. [The energy content of air masses and its determination from aerological ascents.] *Leipzig. Universität, Geophysikalisches Institut, Veröffentlichungen*, Ser. 2, 16(3):325-353, 1953. 8 figs., 7 graphs (fold.), 16 refs. DWB—Five energy diagrams have been developed for use in calculating thermodynamic properties of air masses from radiosonde ascent data. Diagram I is for vapor pressure and dew point; II, for equivalent excess from vapor pressure; III, same from dew point; IV, potential and kinetic energy and V, etagram analysis. The development, construction and use of these diagrams is explained and the diagrams as well as the theory whereby the author attempts to show that H , the total energy in an air mass, is a more conservative parameter for air mass analysis than is the conventional equivalent potential temperature θ_E . *Subject Headings: 1. Energy diagrams 2. Etagram analysis 3. Aerological diagrams 4. Air mass analysis.—M.R.*

5.8-33

551.501.7:551.513.2

†South Africa. Weather Bureau, *Southern Hemisphere Project of the Weather Bureau. Tables, diagrams and charts for 1952*. *South Africa. Weather Bureau, Notos*, 2(1/2):40-142, 1953. charts, numerous tables. DWB. Also: *Circulation indices adopted for the Southern Hemisphere Atmospheric Project*. *Ibid.*, p. 37-39. bibliog. p. 38-39. DWB—The tables cover sea level pressure: daily and mean monthly values along latitudes 15, 20 . . . 65 and 70°S; 500 mb heights: mean monthly values at fixed gridpoints along latitudes 10, 20 . . . to 90°S; 1000-500 mb thicknesses: mean monthly values at fixed points along latitudes 10, 20 . . . to 90°S; zonal indexes: daily values of 220, 230, 240, 250 and 260 for three sectors and for the hemisphere; meridional indexes: daily values of M30, M45 and M50. Some diagrams for selected zonal and meridional indexes are given. The charts include sea level pressure, 500 mb height and 1000-500 mb thickness; all are mean monthly and mean seasonal charts. Zonal indexes have been computed for over relatively small latitude differences between 25°S and 68°S. They are Z20, Z30, Z40, Z50, Z60 mps. The zonal wind profile for winter is given. Also meridional indexes computed for latitudes 30°S, 45°S and 60°S namely, M30, M45 and M60, respectively, are given. *Subject Headings: 1. Sea level pressures 2. Zonal index 3. Meridional index 4. Southern Hemisphere.—I.L.D.*

5.8-34

551.501.81:551.551:551.576.1

Jones, R. F., *Radar echoes from and turbulence within cumulus and cumulonimbus clouds*. *Great Britain. Meteorological Office, Professional Notes*, 7(109), 1954. 19 p. 8 figs., 5 tables, 5 refs. M.O. 524i. GB-MO—Spitfires carrying accelerometers flew on selected tracks through clouds; simultaneous ground measurements of echo intensity were made. Frequency N per 1000 yards of gusts of 0.1 gn to $0.1 \text{ g}(n+1)$ in clouds giving echo was $5.46 \times 10^{-0.328n}$ and in clouds giving no echo $6.78 \times 10^{-0.363n}$. U. S. thunderstorm data gave $2.963 \times 10^{-0.279n}$. Variations of coefficients with height up to 40,000 ft are tabulated. Turbulence increases with height in CuNb nearly half way up cloud, remains constant up to top third and then decreases. Severity of turbulence is related to radar echo characteristics; it is greatest on edges of echoing volume. *Subject Headings: 1. Radar analysis of clouds 2. Cumulonimbus clouds 3. Turbulence.—C.E.P.B.*

OBSERVATIONAL DATA

See also: 50 year's rainfall, Nagapattinam (Ramakrishnan), 5.8-202; Snow melt, phenological factor (Kreeb), 5.8-216.

5.8-35

551.506:551.507.2(261.2) 551.553.6(261.2)

Meincke, —, *In memoriam "S2."* *Wetterlotse*, 68/69:49-53, April 1954. 2 figs. Also: Schneider, Heinrich, *Feuerschiff "S2" im Nordsee-Orkan vom 31.1-1.2.1953*. [Lightship "S2" in the North Sea hurricane.] *Ibid.*, 54-57. Rodewald, M., *Die Kettenbruch-Wetterlagen für Feuerschiff "S2."* [The weather situation in which the cable of "S2" broke.] *Ibid.*, 57-65, 6 figs. Petri, O., *Wellen beim Feuerschiff "S2," (Ergebnisse der Beobachtungen 1949-1952.)* [Waves at the lightship "S2." (Results of observations 1949-1952).] *Ibid.*,

66-70, fig. Richter, Johann, *Einiges vom Klima bei "S2."* [About the climate of "S2." *Ibid.*, 70-77. 3 figs., 2 tables. *Über die Häufigkeit der Windstärken—am Beispiel "S2."* [On the frequency of wind strengths—example of "S2." *Ibid.*, 77-80. 3 figs. DWB—"S2," the most westerly of the German lightships (54°N, 3°32'E) made complete meteorological observations from April 29, 1947 to Nov. 10, 1953. This series of articles gives examples of its work. SCHNEIDER describes experiences in the storm of Jan.-Feb. 1953. RODEWALD illustrates storms of Jan. 1 and March 1, 1949, in which the cable broke. PETRI gives annual variations of frequencies of wind forces, storms and fog, and illustrates representation of frequency distribution of wind forces by a Poisson curve. *Subject Headings:* 1. Marine meteorological observations 2. Wind frequencies 3. Lightships 4. North Sea. I. Schneider, H. II. Rodewald, M. III. Petri, O. IV. Richter, J.—C.E.P.B.

5.8-36

551.506.1(71)

*Canada. Meteorological Div., *Annual meteorological summary for Halifax, N. S., 1953* [1954] 35 p. mostly tables. DWB—The history of the station and location of equipment, topography, types of instruments now in use and general weather conditions for 1953 and for each month separately are first outlined. Summary tables of elements by months and for the year, with unusual occurrences are next tabulated. The main part of the report consists of detailed daily and monthly data for 1953 and for the entire period of record (1874-1953) including all of the usual temperature, precipitation, snow and sunshine data for each month of each year of record. *Subject Headings:* 1. Annual meteorological reports 2. Climatic data 3. Long period records 4. Halifax, Nova Scotia.—M.R.

5.8-37

551.506.3:551.582.2(43)

*Hoelscher, Lothar, *Beiträge zur Kenntnis des Klimas von Halle/S. 1851 bis 1950 bzw. 1901 bis 1950.* [Contributions to the climatology of Halle.] Germany. *Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen*, 3(24), 1950, 80 p. 13 figs., 35 tables, 6 refs. DWB—This work, which consists mainly of tables, summarizes in great detail the observations at two stations in Halle (51°29'N, 11°58'-59'E, heights 90.8 and 104 m above MSL), with numerous subsidiary tables and curves. Monthly annual means and extremes of temperature, numbers of hot days, frost and ice days are given for each year, with means of pentads and individual days. Precipitation, sunshine and pressure are treated in similar detail. The introduction, besides describing the tables, discusses singularities in all elements, and historic floods on the Saale River. *Subject Headings:* 1. Climatic data 2. Long period records 3. Halle, Saxony.—C.E.P.B.

5.8-38

551.506.7:551.510.5(71)

*Havens, R. J. and Lagow, H. E. (*Naval Res. Lab.*), *The average atmosphere up to 200 km.* *Société Royal des Sciences de Liège, Mémoires*, 4th Ser., 12(1/2):185, 1952. DLC—Data of pressure, density, temperature, scale height, sound velocity and mean free path (N₂) for each 10 km from sea level to 160 km (fragmentary data at 200 km) are tabulated on the basis of 10 rocket flights at White Sands, N. M. (2 flights to 160 km). *Subject Headings:* 1. Atmospheric models 2. Standard atmosphere 3. Atmospheric structure 4. Upper air density data 5. White Sands, N. M.—M.R.

5.8-39

551.506.8(47)

†Johansson, Oscar V., *Die Phänologie in Finnland, 1750-1950. Phänologie und Mikroklima. Nachträge zu dem phänologischen Bande 11.* [Phenology in Finland, 1750-1950. Phenology and microclimate. Supplement to the phenological volume 11.] *Helsinki Universitet. Meteorologian Laitos, Mitteilungen*, No. 69, 1954. 55+18+13 p. 7 tables, 71 refs. Reprint from: *Finska Vetenskaps-Societeten, Helsinki, Commentationes Biologicae*, 11(1, 10, 11). DWB, DLC—The complete history of the development of phenology in Finland is given in these papers. All important series of observation and their results are mentioned. Tables of biologically important dates for a large variety of plants and animals are reproduced from several of the reports quoted, along with meteorological data (especially temperature values and ice breaking dates). Recent microclimatological and comparative local-phenological observations are also discussed. The close relation between phenological data

eteorological factors is demonstrated throughout the review. The long list of references to Finnish literature makes this a valuable bibliographic source. *Subject Headings: 1. Phenology 2. Microclimatology 3. History of phenology 4. Finland.—G.T.*

5.8-40 551.506.9:551.594.13:550.371

Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y., *Study of the earth's electrical field*. Contract AF 19(122)-467, Report No. RA-764-P-10, Tenth Quarterly Report, Aug. 1-Sept. 31, 1953. 7 p. ref. **MH-BH**—The purpose of this project is to investigate the earth's electric field and atmospheric electrical conductivity, and to correlate these quantities with meteorological parameters. Present project effort marks the completion of a substantial stock of instrumentation and the beginning of increased efforts at data analysis. The redesigned electric field meter system was completed and installed. Recording was transferred to the multi-channel recorder for all of the appropriate parameters, including field, positive and negative conductivity, rainfall, wind-direction, and solar radiation intensity. Partial records were obtained for these quantities, and also for barometric pressure, temperature, and humidity. Further periodic observations were made of selected meteorological conditions, including cloud ceiling and type, cover, visibility, state of weather, state of ground, and wind speed. The beginnings of certain more-or-less well-defined patterns of behaviour were observed for field and conductivity fluctuations during both fair weather and disturbed weather conditions. *Subject Headings: 1. Atmospheric conductivity 2. Geoelectric field 3. Weather type comparisons. I. Contract AF 19(122)-467 II. Garber, David H.—Author's abstract.*

5.8-41 551.506.9:313

Fukui, Eiichiro, *Climatic disasters of Japan*. *Journal of Geography*, Tokyo, 61, No. 686:126-129, 1952. diags. In Japanese; English summary p. 126. Also in: *International Geographical Congress, 17th, Washington, D. C., Aug. 8-15, 1952, Proceedings*. **DWB**—Five meteorological phenomena, viz. floods, storms, freezing temperature, drought and snow, which frequently cause disasters in Japan are described as to their physical and statistical aspects. Maps of Japan indicating regions susceptible (on a disaster scale) to one or several of these phenomena are presented. It is found that the total intensity of disasters is highest in Hokkaido Prefecture. *Subject Headings: 1. Climatic disasters 2. Japan.—G.T.*

INSTRUMENT CARRIERS

See also: Lightship "S2" in North Sea hurricane (Meincke, others), 5.8-35.

5.8-42 551.507.1

Miller, P. H., *Description and use of a mobile weather unit*. *U. S. Naval Ordnance Test Station, Inyokern, Calif., Technical Memorandum*, No. 1766, March 1, 1954. 5+p. 8 figs. **DWB**—The mobile weather unit described in this paper is mounted in a 2½-ton van-type truck. It is designed for operation (surface weather and upper wind observation) in remote locations at short notice. The crew of two men can set up the equipment and start operation within 30 min after arrival. Photographs of exterior and interior views of the unit and 6 diagrams showing layout of the equipment, are presented. *Subject Heading: 1. Mobile weather stations.—G.T.*

5.8-43 551.507.2(261)

Frankcom, C. E. N., *North Atlantic ocean weather stations*. *Meteorological Magazine*, London, 83(983):133-137, May 1954. fig., photo. **DWB**—The agreement reached at the fourth North Atlantic Ocean Station Conference in Paris, Feb. 9-25, 1954, is summarized, with a chart of the new ship positions. The agreement comes into force on July 1, 1954. *Subject Headings: 1. Ocean weather stations 2. North Atlantic.—C.E.P.B.*

5.8-44 551.507.352:551.508.7

Katz, R. E. (*Naval Res. Lab.*), *Airborne techniques for studying precipitation and precipitation clutter*. [Nov. 1950.] 4 p. 5 figs., 3 refs. Mimeo. Abstracted from separated sheets. **DWB**—A disdrometer, capillary collector, electric field meter, wet and dry bulb

thermometer and dew point meter were installed on a Navy PBM seaplane and used in the Philippines (1946), Panama (1947) and at Key West, Fla. (July 1950) in connection with radar measurements of liquid water content of clouds, rainfall, etc. It was found that the disdrometer gave readings 5 to 30 times as high as the capillary collector (which is considered to give more nearly representative values). Attempts to determine cause of errors are discussed. Equipment and mounting is illustrated. *Subject Headings:* 1. Airborne instruments 2. Disdrometers 3. Capillary collectors 4. Liquid water content of clouds 5. Radar precipitation measurement. I. U. S. Naval Research Laboratory.—M.R.

INSTRUMENTS

See also: Snow research in Finland (Angervo), 5.8-22; Air-borne technique for study of precip. (Katz), 5.8-44; Radiosonde measurement of electrical conductivity in upper air (Venkiteshwaran, others), 5.8-275.

5.8-45

551.508:551.

Gill, Gerald C. (*Round Hill Field Station, M.I.T., Mass.*), **Micrometeorological instrumentation at M.I.T.'s Round Hill Field Station.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 19:171-185, Dec. 1952. figs. DWB—Detailed description of instrumentation used on a 144 ft permanent tower and on a 36 ft portable tower (hot wire anemometers with ultrafast response, light weight bivanes, thermocouples). A wind tunnel for testing and calibration of instruments was constructed. A heat flux instrument is under development, which would measure continuously the vertical turbulent velocity and the temperature anomaly and give an output that is proportional to the instantaneous value of their product. *Subject Headings:* 1. Micrometeorological instrumentation 2. Turbulence measurements.—A.A.

5.8-46

551.508

Raschke, K., **Die Kompensation des Strahlungsfehlers thermoelektrischer Messfühler** [Compensation of the radiation error of a thermoelectric element.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 5(3/4):446-455, 1954. 4 figs., 9 refs., eqs. German, English and French summaries p. 447-448. **DLC**—A method of compensating the radiation error of a thermocouple by introducing a second thermocouple is described. The method has been used for a thermoelectric psychrometer. *Subject Headings:* 1. Thermocouples 2. Thermocouple errors.—C.E.P.B.

5.8-47

551.508

Antunes, M. T., **Sur la perturbation produite par les hémisphères protecteurs, en vue des mesures solarimétriques effectuées avec la pile Moll.** [On the perturbations produced on the solarimetric measurements with the Moll thermopile by the glass hemispherical domes.] *Sociedade Portuguesa de Ciências Naturais, Lisbon, Boletim*, 2nd Ser., 4(2):163-197, 1954. 8 figs., 10 refs., 43 eqs. In French; English summary p. 195-196. Abstracted from report. **DLC**—In order to determine the effect of using two hemispheric glass covers for a pyrheliometer the author made a quantitative theoretical and experimental study of the angular deviation that a light ray experiences in traversing the protective covers of a solarimeter for different solar angles and one or two glass domes and the angle at which the ray strikes the thermopile and resulting errors in incident energy. The conclusion is that the variations of the error produced in the thermopile by the glass covers are not excessive, and that the source of error lies in the optical properties of the thermopile itself. The use of two concentric glass domes is not recommended. *Subject Headings:* 1. Pyrheliometer covers 2. Pyrheliometer errors.—M.R.

5.8-48

551.508

Courvoisier, P. and Wierzejewski, H., **Das Kugelpyranometer Bellani. Beiträge zur Strahlungsmessmethodik V.** [The Bellani spherical pyranometer. Contribution to radiation measurement technique.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 5(3/4):413-446, 1954. 3 figs., 20 refs., 18 eqs. German, English and French summaries.

3-446. **DLC**—The history and importance of measuring radiation on a freely exposed sphere are discussed and the theory, construction, calibration and working of the Bellani instrument are described. In spite of its simplicity the error in the integrated daily radiation is less than 3%. *Subject Heading: 1. Bellani pyranometer.—C.E.P.B.*

5.8-49 551.508.21

Fleischer, Richard, *Die Strahlungsmesskugel nach Larchè-Schulze*. [Larchè-Schulze radiation measuring sphere.] *Geofisica Pura e Applicata*, 26:172-182, 1953. 6 figs., 12 refs. In German; German and English summaries p. 172. **MH-BH**—The form of the "radiation measuring sphere" according to LARCHÈ-SCHULZE which has been in use since 1949, is described. It has been developed only for measuring monochromatic radiation to realize a flat surface following the cosine-law. In order to enable us to obtain continuous records in the open air, the Larchè-sphere has been complemented by an easily heated case which protects it against bad weather and by a case which controls its sensitivity. *Subject Headings: 1. Radiation instruments 2. Larchè-Schulze radiation meter.—Author's abstract.*

5.8-50 551.508.21

Kreitz, Ernst, *Ein einfaches Gerät zur Registrierung der langwelligen Gegenstrahlung auch bei Tage*. [A simple device for recording long wave back radiation even in daytime.] *Geofisica Pura e Applicata*, v. 26:183-190, 1953. 6 figs., 6 refs. In German; German and English summaries, p. 183. **MH-BH**—On the basis of experimental investigations a recording pyrgeometer for measuring the long wave radiation of the atmosphere has been built and used successfully for some months. The radiation is received by a thermopile whitened with magnesium oxide to reflect the short wave radiation during the daytime. Wind is shielded off by a filter of "KRS5," ground in the shape of a diffracting lens in order to better comply with the cosine law. Recording has been going on continuously with a dotted line recorder since March 1953 (independent of weather conditions and day or night time) and will be continued. The complete measuring apparatus is calibrated absolutely in cal/cm² min. Some sample records are shown in this paper, and the qualities of the instrument are discussed. *Subject Headings: 1. Pyrgeometers 2. Long wave radiation measurement.—Author's abstract.*

5.8-51 551.508.21:551.521.6

Parker, C. A. and Hatchard, C. G., *The measurement of absolute light intensities by means of the ferrioxalate actinometer*. Holton Heath, Poole, Admiralty Materials Laboratory, Report, No. A.M.L. (External) A/42(M), 1953. 10 p. 4 figs. Mimeo. **GB-MO**—Describes working details of application of photochemical change of potassium ferrioxalate solutions for measurements of visible and UV radiation between 2537 and 4358 Å. With suitable band-pass filters, it is satisfactory for measuring actinic values of sunlight and skylight. *Subject Heading: 1. Ferrioxalate actinometer.—C.E.P.B.*

5.8-52 551.508.21:535.33

Yoshinaga, Hiroshi and Yamada, Yahiko (*Engr. Faculty, Osaka Univ.*), *Construction of far infra-red spectrometer with echelette grating*. Tokyo. University of Education, Institute for Optical Research, *Science of Light*, 2(1):18-29, Aug. 1952. 12 figs., refs., eqs. **DWB**—In order to analyze the far infra-red radiation, the echelette gratings of grating constant 12.5-μ have been ruled and examined on the groove form and the diffracted intensity distribution in each order by the residual quartz ray. About 60% of radiation energy is concentrated in the first order at one side. A far infra-red spectrometer of the Michigan spectrometer type was constructed with these echelette gratings, and the test of this spectrometer was performed by the residual rays from some crystals and by the absorption of CS₂ and CCl₄ molecules. The results show that this spectrometer is useful to 35μ or more and has the resolving power of 83 cm⁻¹ at 25μ. *Subject Headings: 1. Spectrometers 2. Radiation instruments.—Authors' abstract.*

5.8-53 551.508.29:551.525.5

Georgi, J., *Über die Feststellung der Frostgrenze im Boden und ihrer Veränderung*. [On the determination of the frost limit in ground and its change.] *Meteorologische Rundschau*,

7(1/2):22-23, Jan./Feb. 1954. DWB—Describes an apparatus long in use at Parc St. Ma Paris, consisting of a graduated stake into which open-ended waterfilled tubes 20 mm×4 mm outside diameter are inset horizontally 6 mm apart. The stake is inserted in a nonconducting tube and depth of freezing can immediately be read off. *Subject Heading: 1. Freezing observation.*—C.E.P.B.

5.8-54

551.508.29:551.584

Kreeb, Karlheinz, **Eine neue Methode für Temperaturmessungen an Pflanzen.** [A new method for temperature measurements on plants.] *Meteorologische Rundschau*, 7(1/2):13-14, Jan./Feb. 1954. 2 tables, 2 refs. DWB—The method consists of placing on the plant (leaf or on bare ground small crystals of substances and observing which of them melt. Melting points of 29 substances are listed, ranging from 20-80°C. A few results are given, compared with air temperatures. *Subject Heading: 1. Plant temperature measurement.*—C.E.P.B.

5.8-55

551.508

Newstead, G. and Beck, A., **Borehole temperature measuring equipment and the geothermal flux in Tasmania.** *Australian Journal of Physics*, Melbourne, 6(4):480-489, 1953. 4 figs., table, 9 refs. MH-BH—An instrument, using a thermistor and an A.C. bridge circuit, is described by which temperature measurements in boreholes can be made to 0.01°C. Results of temperature measurements in Tasmania are given and a value of 2 cal cm⁻² sec⁻¹ is obtained for the heat flux (uncorrected for recent glaciation). *Subject Headings: 1. Borehole temperature instruments 2. Temperature measurement 3. Borehole temperatures 4. Tasmania.*—Authors' abstract.

5.8-56

551.508.3

Huss, Eduard, **Ein neuer Windschreiber für kleine Windgeschwindigkeiten.** [A new wind recorder for light winds.] *Geofisica Pura e Applicata*, 25:83-91, 1953. 3 figs., 3 refs. German, English and French summaries p. 83. MH-BH—A description of the design and construction of two models of a mechanically recording anemometer combined with a thermohygrograph capable of measuring simultaneously wind velocity, temperature and relative humidity. The range of wind velocities that can be measured is between 0.4 and 3.5 m/sec. Wind velocity is measured by means of wind pressure plates which are arranged either according to the Wild principle or so as to rotate about a vertical axis. Photographs and diagrams of the instruments are given and their calibration and application to microclimatic as well as to synoptic studies are described. *Subject Heading: 1. Recording anemometers.*—I.L.D.

5.8-57

551.508.7

Hirst, J. M., **A method for recording the formation and persistence of water deposition on plant shoots.** *Royal Meteorological Society, Quarterly Journal*, 80(344):227-231, April 1954. 3 figs., 4 refs. MH-BH—For investigation of potato blight a recording balance was constructed in which a potato shoot is sealed into a moist chamber. This was used to find the amount of time when leaves were wet after rain, but it also measures deposition of dew. The heat of dew was 6.9×10⁻³g/cm² compared with 9.6×10⁻³ for amount of water retained during rain. *Subject Headings: 1. Drosometers 2. Rainfall retention meters 3. Potato blight.*—C.E.P.B.

5.8-58

551.508

Schiess, Josef, **Über eine Feuchterprüfanlage grosser Genauigkeit.** [On a moistness testing apparatus of great accuracy.] *Annalen der Meteorologie*, 6(1/2):33-38, 1954. 4 figs., 2 tables, 4 refs., 4 eqs. MH-BH—The apparatus, designed to test hygrometric instruments and tables, measures exactly the relative humidity over a wide range at temperatures of 25 and 40°C. A working diagram is shown and calculation described. Measurements compared with the Assmann psychrometer, electrically ventilated at different rates. *Subject Heading: 1. Hygrometer testing.*—C.E.P.B.

5.8-59

551.508

Jennings, E. G. and Monteith, J. L., **A sensitive recording dew-balance.** *Royal Meteorological Society, Quarterly Journal*, 80(344):222-226, April 1954. 4 figs., 6 refs. MH-BH—

The instrument consists of a grass-covered soil core 8 in. across and 11 in. deep on a sensitive motionless balance, recording by deflection of a light spot. Three specimen records in a field show evaporation by day and dew deposition at night. Only a small part of the dew comes from condensation from the air. *Subject Heading: 1. Drosometers.—C.E.P.B.*

5.8-60

551.508.77

Handžić, M., **Problem merenja padavina na Bjelašnici.** [The problem of precipitation measurement at Bjelašnica Observatory.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 1950:97-99, Nov./Dec. 1952. **DWB**—Totalizer gages used at Bjelašnica Observatory give considerably higher results than ordinary rain gages. The reasons for this discrepancy are discussed. It appears that both types of instruments yield inaccurate readings. The Hellmann-type gage, which would eliminate the shortcomings of the gages currently in use, is described and illustrated. *Subject Headings: 1. Rain gage comparisons 2. Bjelašnica Observatory, Yugoslavia.—G.T.*

5.8-61

551.508.77

Levert, Christoffel, **Die Schwierigkeiten bei der Auswertung der Aufzeichnungen beim Niederschlagsmesser des Waageprinzips infolge des besonderen Koordinatennetzes des Dreistreifens.** [Difficulties in evaluating records of the balance pluviograph because of the special coordinate system of the recording strip.] *Annalen der Meteorologie*, 6(1/2):26-32, 1953/54. 6 figs., 2 refs., 11 eqs. German and English summaries p. 26. **MH-BH**—The correct coordinates of the curved reference markings on the recording sheet of the balance pluviograph are worked out, but the accurate evaluation of the records is difficult. Hence, the author considers that pluviographs of the float type are preferable. *Subject Heading: 1. Rain recorders.—C.E.P.B.*

5.8-62

551.508.77

Molga, Marian, **O wpływie wysokości umieszczenia deszczomierza na wielkość opadów atmosferycznych.** [On the influence of the height of the rain gage location on the amount of precipitation.] *Gazeta Obserwatora PIHM*, Warsaw, 4(10):1-4, Oct. 1951. **DLC**—In order to point out the importance of strict observation of instructions regulating the installation and proper use of even such simple meteorological implements as the rain gage—the author presents results of rain gaging experiments carried out during the period July 1949 to Aug. 1951 at the meteorological station of Brwinów near Warsaw with 3 identical gages installed at ground level, 1 m and 2 m height. It is shown that the elevation of the gage above ground level affects the results of the measurement which will be higher or lower depending on the development and intensity of other meteorological elements during the precipitation and on the intensity of the precipitation itself. *Subject Headings: 1. Rain gage sites 2. Rain gage height.—A.M.P.*

5.8-63

551.508.77

Serra, L., **La mesure correcte des précipitations.** [The correct measurement of precipitation.] *La Houille Blanche*, Grenoble, v. 8, *Special No. A*: p. 152-158, March/April 1953. 6 figs., 2 eqs. **DLC**—The author, who in a previous paper was more in favor of the universal use of rain gages with horizontal openings (see item 4.5-169, May 1953, *MAB*), now finds that rain gages with openings tilted parallel to the slope of the land have certain advantages. The ratio between the measured rainfall amounts can be computed knowing the slope of the land and the falling angle of raindrops, which can be determined indirectly by parallel measurements with both gages. *Subject Headings: 1. Precipitation measurement 2. Rain gage exposure 3. Orographic effects.—A.A.*

5.8-64

551.508.94:551.594.11

Bossolasco, Mario and Meda, Fernando, **Perfezionamenti nelle misure di elettricità atmosferica.** [Improvements in the measurement of atmospheric electricity.] *Geofisica pura e Applicata*, v. 25:214-220, 1953. 5 figs., 2 refs. Italian and English summaries p. 214. **MH-BH**—A recording electrometer for atmospheric potential is described. It makes use of a special triode with inverted electrodes (controlled by the anode, as already made by

L. KOENIGSFELD and PH. PIRAUX). Among the improvements realised, the following characteristics are to be noted: 1) The difficulties of electric insulation are overcome because the electrometric tube is built as a whole with the radioactive collector; 2) Both the positive and the negative fields can be recorded with different sensitivity by a convenient back-voltage; 3) The instrument operates with dry batteries alone and, also in account of its light weight, can be carried about quite easily and quickly installed. *Subject Heading: 1. Atmospheric electricity instruments.*—*Authors' abstract.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: Thunderstorm and squalls (Kolobkov), 5.8-4; *Synoptic study for Ikateq, Greenland* (Sanders), 5.8-262.

5.8-65

517:551.509

Hori, Jun-ichi and Kobayashi, Tesaku, **On the prediction of non-stationary time-series**. *Sapporo, Japan. Hokkaido Univ. Institute of Low Temperature Science, Low Temperature Science*, No. 9:83-92, 1953. Also: **On the multiple prediction.** *Ibid.*, p. 93-105. figs., 10 refs., egs. In Japanese; English summaries p. 92, 104-105. DWB—The scheme of the prediction of the non-stationary time series, which has previously been proposed by K. IMAHORI, is discussed in detail. It was concluded that it amounts to the assumption that the observed time series is described by the equation of form:

$$a_n(t) \frac{d^n q}{dt^n} + a_{n-1}(t) \frac{d^{n-1} q}{dt^{n-1}} + \dots + a_1(t) \frac{dq}{dt} + a_0(t) q = p(t),$$

which has temporally variable coefficients, instead of the equation with constant coefficients which is used as the fundamental equation in the stationary cases. Two different mathematical formulations of the prediction scheme based upon this equation were proposed, one of which makes use of ZADEH's theory of frequency analysis of variable networks, and the other is based on the principle of stationarization with respect to the power spectrum. The former is mathematically rigorous but involves considerable practical difficulties, while the latter is expected to be useful in practice and will be applied subsequently. IMAHORI's theory of prediction of stationary time series was extended to the case of multiple prediction, which came out essentially the same as WOLD-OGAWARA's prediction theory of vector time series. IMAHORI's approximate procedure can also be generalized, but it was concluded that when the approximate method is employed, no increase in efficiency can be obtained by the use of multiple time series. The origin of this rather surprising result was discussed in some detail. *Subject Heading: 1. Differential analysis 2. Statistical forecasting.*—*Authors' abstract.*

5.8-66

551.509

Watanabe, T., **A dynamical method for obtaining the air particle which arrives at a point after a definite time interval.** *Journal of Meteorological Research*, Tokyo, 4(8):58-63, Nov. 1952. 4 figs., 2 tables. In Japanese; English summary p. (36). MH-BH—ROSSBY's trajectory method the author develops a dynamical method for obtaining the particle which arrives at a fixed point after a specified number of hours. A sample diagram containing the isovelocity lines and isogonic lines of the initial velocity distribution of such air particles is presented. *Subject Heading: 1. Air trajectories.*—*Author's abstract.*

5.8-67

551.509.317:1

Bushby, F. H. and Hinds, Mavis K., **The computation of forecast charts by application of the Sawyer-Bushby two-parameter model.** *Royal Meteorological Society, Quarterly Journal*, 80(344):165-173, April 1954. 6 figs., table, 7 refs., 7 eqs. MH-BH—The Sawyer-Bushby 2-layer baroclinic model (see 3.10-76, Oct. 1952 and 5F-76, June 1954, MAB) was used as a basis for two series of 12 hr and 24 hr forecasts of 1000 and 500 mb pressure over Africa and Europe, using a 260 km net and time steps of 2 hr or 1 hr. Computed and observed values are shown. Results were good except where affected by arbitrary boundary conditions.

relations mostly 0.4 to 0.9. *Subject Headings:* 1. Numerical forecasting 2. Synopticology 3. Machine methods.—*C.E.P.B.*

5.8-68

551.509.317:551.513.2:551.557

Gleeson, Thomas A., *Note on criteria for the movement and development of waves in the westerlies*. Florida. State University. Dept. of Meteorology, Contract AF 19(122)-466, Scientific Report No. 4, May 31, 1953. 17 p. 2 figs., 2 tables, 4 refs., 38 eqs. *MH-BH*—Two methods of predicting the movements of upper level troughs (developed by Rossby, 1939 and 1942) are analyzed and compared with a view toward application in forecasting development and movement of cyclones or troughs into the Mediterranean. The two models both assume a flat earth, constant west wind component, periodically but constantly fluctuating S wind component, no vertical motion and no friction. In other respects the two models differ (rotation of earth, temperature gradient, homogeneity of atmosphere, etc.). A combined model is developed and its usefulness critically appraised. *Subject Headings:* 1. Upper level trough movement 2. Waves in the westerlies forecasting 3. Waves in the westerlies. Florida. State University. Dept. of Meteorology II. Contract AF 19(122)-466. Rossby, C.-G.—*M. R.*

5.8-69

551.509.317:551.547:551.557

Murray, R., *On the accuracy of contour charts in forecasting upper winds*. *Great Britain. Meteorological Office, Professional Notes*, 7(110), 1954. 11 p. 12 tables, 14 refs. *M.O.* 524j. *B-MO*—Errors in estimating geostrophic winds from contour charts are analyzed into component errors. The overall root-mean-square error increases from 8 knots at 700 mb to 16 at 200 mb level. Errors due to apparent geostrophic departure on working charts combine these errors with real departures from geostrophic and are 10-20 kn. Errors of 24 hr forecast winds at a point are 17-26 kn. Accuracy of 24 hr root-mean-square errors due to each cause are tabulated for 700, 500, 300 and 200 mb. Erroneous forecasting is the largest cause of error but the total errors are less than the 24 hr wind variation. *Subject Heading:* Upper air wind forecasting.—*C.E.P.B.*

5.8-70

551.509.317

Schmitt, W., *Upper air analysis for the Southern Hemisphere*. *South Africa. Weather Bureau, Notas*, 2(1/2):20-27, 1953. fig., 7 refs. *DWB*—The 500 mb height and the 1000-500 mb thickness charts for the Southern Hemisphere have been constructed upon a stereographic (cumpolar projection with scale 1:40 million at 30°S. The aerological stations providing the basic synoptic data are temperature stations, pilot stations and a few high altitude stations in South America. Detailed analysis of the daily sea level map, of the 1000 mb map and of the 1000-500 mb thickness and of the 500 mb map are given. *Subject Headings:* 1. Upper air analysis 2. Southern Hemisphere.—*I.L.D.*

5.8-71

551.509.319:551.578(521.84)

Nishida, M., *Objective weather forecasting in Hiroshima*. *Journal of Meteorological Research*, Tokyo, 4(9):627-630, Feb. 1953. 8 figs. In Japanese; English summary p. (39). *H-BH*—The author discusses a method for predicting whether it will rain during the following 24 hours at Hiroshima. The factors used are dew point at Hiroshima and Ishigakijima, 1000 mb wind direction at Itazuki and 700 mb mixing ratio at Yonago. *Subject Headings:* Objective forecasting 2. Rainfall forecasting 3. Hiroshima, Japan.—*From author's abstract.*

5.8-72

551.509.33

§Borisova, L. G., *Sostavlenie dolgosrochnykh prognozov pogody maloī zablagozemennosti v territorii Sibiri*. [Compilation of extended forecasts for Siberia.] *Meteorologiya i Gidrometeorologiya*, No. 5:68-77, 1949. 3 figs., 5 refs., 2 eqs. *DLC*—Explains some aspects of weather forecasting for 3-18 days according to PAGAVA's method (which is essentially based on a comparison of the current synoptic processes with analogous developments given in a number of schemes not presented here). For this purpose the 500 mb topography and isallobaric charts as well as the relative topography 500/1000 mb are prepared daily. Due to the paucity

of aerological stations in Siberia, a special construction technique is used, based on ground observations for the 900 mb surface, and on scattered ascents and personal judgment for high surfaces. The main task for the forecaster is to watch the beginning of a new "synoptic period" in order to determine its tendency on the basis of observations during the first 2-3 days, especially considering the location of isallobaric centers in regard to the pressure formation and to compare it with the synoptic history of the previous period. A synoptic example is discussed on this basis, showing the effect of pressure formations in the Siberian Arctic. *Subject Headings: 1. Extended forecasting 2. Pagava's method 3. Siberia, U.S.S.R.—A.A.*

5.8-73

551.509.33:551.57

Sakai, H., **On the long-range forecast of snow coverage.** *Journal of Meteorological Research*, Tokyo, 4(7):408-410, Oct. 1952. fig., table. In Japanese; English summary (26). **MH-BH**—Author shows how long-range forecasts of amount and duration of snow cover can be made for Tohoku, Japan, by correlating data of Fukushima (warm and little snow) with those of Akita (cold and much snow). The analysis on which the author's method is based includes establishment of correlations between the above factors and temperature, rainfall and snow-coverage period. *Subject Headings: 1. Snow forecasting 2. Long range forecasting 3. Japan.—Author's abstract.*

5.8-74

551.509.33(4)

A távidőjelzés kérdésének állása Magyarországon. [Present state of long-range forecasting in Hungary.] *Időjárás*, Budapest, 57(5):266-271, Sept./Oct. 1953. **DLC, MH-BH**—This is an account of a meeting held at the Hungarian Academy of Science, with Zoltán BERKES as the principal speaker. Representative Hungarian meteorologists participated in the discussion. Hungarian long-range forecasts (prepared by using (a) MULTANOVSKI's method adapted to Hungary and (b) results of recent investigations of the correlation between the lunar cycle and weather) are claimed to yield an accuracy of 70%, which is considered insufficient for public distribution of such forecasts. BERKES recommends the following 6-point program for improving the accuracy of long-range forecasts: 1) drawing more MULTANOVSKI-type maps, 2) investigating the correlation between general circulation types, solar activity or phases of the moon, 3) investigating singularities on the basis of RADIATION law concerning the effect of the date of full moon around March 21 on summer precipitation, 4) more accurate forecasting of solar activity and investigating the correlation between magnetic variations and weather, 5) determining regional correlations on the basis of monthly climatic reports and 6) analyzing upper air charts as to natural synoptic periods. The long-range forecast section of the Hungarian Meteorological Institute is now acting along these lines. *Subject Headings: 1. Long-range forecasting 2. Hungary.—G.T.*

5.8-75

551.509.5:551.57

†Gräfe, K., **Über Möglichkeiten der Bestimmung, Berechnung und kurzfristigen Vorhersage der Globalstrahlung am Erdboden.** [On possibilities of determining, calculating and short-period forecasting of global radiation at the earth's surface.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 5(3/4):344-376, 1954. 11 figs., 5 tables, 46 refs., in German, English and French summaries p. 344-345. **DLC**—A preliminary discussion of measurement of total radiation from sun and sky leads to choice of LARCHÈ-SCHULZE's method with a suitable glass cover, giving with a selenium photoelement a record following the cosine law. Daily values of global radiation for a year at Hamburg are shown, and compared with ALBRECHT's normal curve. The global radiation is related to cloud amount and weather, and a method is developed by which it can be forecast synoptically for a day or hour. Examples are given. *Subject Headings: 1. Global radiation 2. Radiation forecasting.—C.E.P.B.*

5.8-76

551.509.5:551.57

*†U. S. Weather Bureau, **A meteorological forecasting investigation for improving prediction of airport acceptance rates.** *Final Report, Pt. I, Summary Report. Pt. II, Development Report.* Prepared by the Short Range Forecast Development Section for the Air Navigation Development Board, ANDB Project 4.4, Phase A. Wash., D. C., July 1, 1951. 7 p., 55 figs., 10 tables, 31 + 7 refs., 8 eqs. **DLC**—It is shown that objective methods of forecasting for flying conditions at airports give better verification than conventional methods or climatic

logical expectancy. Special problems involved in forecasting ceiling, visibility, wind, turbulence, aircraft icing and fog at airports in Eastern U. S., and small scale variations of ceiling and visibility (at San Francisco Airport) together with detailed statistical data used in working out objective tools (frequency charts and scatter diagrams) and verification procedure are treated. *Subject Headings:* 1. Forecast improvement 2. Objective forecasting 3. Airport terminal forecasts 4. Stratus forecasting 5. San Francisco Airport, Calif.—M.R.

5.8-77

551.509.5:551.579

Work, Robert A. (*U. S. Soil Cons. Ser., Medford, Ore.*) and Polos, Anthony J. (*U. S. W. B., Portland, Ore.*), **A new program of co-ordinated Federal-State water supply forecasts.** *Western Snow Conference, 21st, Boise, Idaho, April 1953, Proceedings*, p. 4-5, 1953. Discussion by Fred A. Strauss, p. 69. **DWB**—The Soil Conservation Service prepared water supply forecasts based on more than 1000 mountain snow courses made several times each winter in 12 states. The Weather Bureau uses precipitation measurements, forecasting water supply at more than 20 gaging stations. The new programs fit in with work done by other interested agencies, especially the Div. of Water Resources in California. All forecasts are published in the Weather Bureau's "Water supply forecasts for the Western United States." *Subject Headings:* 1. Water supply forecasting 2. Western United States. I. Strauss, Fred A. II. U. S. Weather Bureau III. U. S. Soil Conservation Service IV. California. Div. of Water Resources.—A.A.

5.8-78

551.509.54

Fukuhara, K., **On the snowfall forecasting.** *Journal of Meteorological Research*, Tokyo, (2):85-88, March 1953. 5 figs., table. In Japanese; English summary p. 85. **MH-BH**—The dependence of snowfall amount on confluence and wind direction is investigated by means of scatter diagrams. Large snowfall amounts are found in the following cases: 1) On the south side of confluence, 2) in the case of strong confluence, 3) near the confluence and 4) when wind direction coincides with the longitudinal position of the valley. *Subject Headings:* 1. Snow forecasting 2. Objective forecasting.—Author's abstract.

5.8-79

551.509.8 551.577

Bähr, Walter, **Erhaltungsneigung des Niederschlages und Bauernwetterregeln.** [Persistence of precipitation and weather lore of farmers.] *Baden. Landeswetterdienst, Jahresbericht mit Abhandlungen, 1951/1952*. p. 45-54. 2 tables, graphs, 6 refs. **DWB**—"Singularities of persistence" during the summer months (May to Oct.) are computed, counting the frequency of precipitation 5, 10, and 20 days after three rainy or three dry days in Karlsruhe (period 1887-1940). The agreement of the graphically presented rather irregular curves with popular weather lore is considered as astonishing by the author. The definite existence of persistence and its decrease with the length of the period is clearly shown. *Subject Headings:* 1. Singularities 2. Persistence 3. Weather lore 4. Karlsruhe, Germany.—A.A.

5.8-80

551.509.83:551.577:523.3(439.1)

Berkes, Zoltán, **A hold fényváltozásai és Magyarország nyári-őszii csapadéka.** [Phases of the moon and summer-fall precipitation in Hungary.] *Időjárás*, Budapest, 57(4):215-220, July/Aug. 1953. 6 figs., 7 refs. Russian and French summaries p. 215. **MH-BH, DLC**—**STVÁN RACSKÓ**, a Hungarian farmer, deduced the following rule from 30 years of experience: if full moon occurs during the days following March 21 there will be a rainy summer; if it occurs during the days preceding March 21 the summer will be dry. The author tried to verify this statement by 52-year homogeneous series for 10 stations (Hungary) and found the rule to apply to $\frac{2}{3}$ of the cases. A 19-year periodicity of precipitation corresponding to the 19-year recurrence of phases of the moon is also identified. The phenomenon is attributed to a mechanism acting through large-scale pressure effects of lunar radiation. The importance of **RACSKÓ's** law from the point of view of long-range forecasting is stressed. *Subject Headings:* 1. Lunar influences 2. Weather lore 3. Precipitation periodicities 4. Hungary.—G.T.

CLOUD SEEDING AND ARTIFICIAL PRECIPITATION

5.8-81

551.509.67

***Howell, Wallace E., Associates, Inc., Cambridge, Mass., Evaluation report of rainfall stimulation program for Central Ermita, May-Dec. 1952.** [1953.] 45 p. 4 figs., tables,

numerous charts. **DWB**—Study gives daily isohyetal maps, during summer and winter operations, a map of isopercentals of normal rainfall, and shows the location of rain gages and generators. A 53% increase of rainfall on the target area as compared with a control area was found. This increase is 3.3 times as large as the standard deviation of observed deviation (probability of chance $<1 = 1000$). *Subject Headings: 1. Cloud seeding evaluation 2. Central Najasa, Cuba.—A.A.*

5.8-82

551.509

*Howell, Wallace E., Associates, Inc., Cambridge, Mass., **Evaluation report of 1952 rain stimulation program for Central Najasa.** [1953.] 7 p. 4 figs., 2 tables, numerous charts. **DWB**—Study gives daily isohyetal maps for seeding days with hodographs of upper winds, a map of isopercentals of relative anomaly and shows the location of rain gages and generators. A 33% increase of rainfall on the target area as compared with a control area was found. Probability of chance is small. *Subject Headings: 1. Cloud seeding evaluation 2. Central Najasa, Cuba.—A.A.*

5.8-83

551.509

*Howell, Wallace E., Associates, Inc., Cambridge, Mass., **Evaluation report of 1951 rain stimulation program for the Francisco Sugar Company.** [1952?] 40×44 cm. unpaginated, mostly charts (colored) with text, 8 tables. **DWB**—This de-luxe "atlas" presents the daily results of the cloud seeding program conducted by MR. HOWELL's Company for the benefit of the Francisco Sugar Co. in the southeastern part of Camagüey Province, Cuba (southern central coastal plains region of Cuba), during Aug.-Nov. 1951. Large full-page isohyetal charts in color based on data from 50 rain gages show the exact areas and amounts of precipitation which occurred in the region during each 24-hour period, and in addition, hodographs show the pilot balloon drift as an indication of the direction the silver iodide drifted from the generators. Radiosonde and surface synoptic data are also used in the summaries of daily meteorological conditions for the analyses which accompany each chart. A 29% total average increase of rain is claimed for the target area, above that on adjacent areas. *Subject Headings: 1. Cloud seeding evaluation 2. Camagüey Province, Cuba.—M.R.*

5.8-84

551.509

*Howell, Wallace E., Associates, Inc., Cambridge, Mass., **Evaluation report of 1952 rain stimulation program for Macareño Industrial Corporation of New York.** [1953.] 7 p. 2 tables, 4 figs., numerous charts. **DWB**—Study gives daily isohyetal winds with hodographs of upper winds, a map of isopercentals of relative precipitation, and shows the location of rain gages and generators. A 35% increase of rainfall on the target area as compared with a control area was found. Probability of chance is $<1:100$. *Subject Headings: 1. Cloud seeding evaluation 2. Macareño, Cuba.—A.A.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE

See also: Average atmos. up to 200 km (Havens, Lagow), 5.8-38; Smoke fog model (Stewart), 5.8-198; Effect of terrestrial atmos. on equilibrium of photo-dissociation and -ionization by UV and X rays (Nicolet), 5.8-267

5.8-85

551.510.41:9

Caroli, Günter, **Bemerkungen zur Aranhypothese.** (Ein Beispiel für statistische Täuschungen.) [Remarks on the aran hypothesis. (An example of statistical illusion.)] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 9:74-76, 1953. 3 figs., 3 refs. **MH-B**—Author investigates the "proved" relation between the coagulation time of dogs' blood and dynamic progresses in the atmosphere. He finds no relation to amount of aran and on doubtful one between aran and passage of warm vs. cold fronts. No relation can be shown between aran and spontaneous agglutination. *Subject Headings: 1. Aran 2. Statistical analysis.—C.E.P.B.*

5.8-86

551.510.41:551.577.1

Maksimovich, G. A., **O roli atmosferynykh osadkov v perenose rastvorenykh veshchestv.** [The role of atmospheric precipitation in the transfer of dissolved substances.] *Akademiia Nauk SSSR, Doklady*, Moscow, 92(2):401-403, Sept. 11, 1953. 11 refs. **DLC**—A discussion of the sources of the mineral content of water of clouds and of precipitation. The mineral content of clouds is derived from oceanic waters and from volcanic gases. Chemical analysis of atmospheric precipitation of the U.S.S.R. showed that mineral content varied with geographic zone: forest zone— $\text{HCO}_3\text{—Ca}$; steppe— $\text{HCO}_3\text{—SO}_4$; desert— $\text{HCO}_3\text{—SO}_4\text{—Cl—Na}$; and near the coasts— $\text{HCO}_3\text{—Ca—Na}$ (Odessa); $\text{HCO}_3\text{—SO}_4\text{—Na}$ (Osipenko). The role of atmospheric circulation in mineral composition and content of atmospheric water is discussed. **Subject Headings:** 1. Rainfall composition 2. Chemical analysis of condensation nuclei U.S.S.R.—*I.L.D.*

5.8-87

551.510.41:546.214

Obenland, E., **Vergleichsmessungen des Ozongehalts in Obersdorf und auf dem Nebelhorn.** [Comparative measurement of ozone content in Obersdorf and on the Nebelhorn.] *Germany. Deutscher Wetterdienst, Mitteilungen*, No. 3, Sept. 1953. 15 p. 3 figs., 4 tables, 5 refs. **MH-BH**—Measurements of the ozone content of the atmosphere at Obersdorf (770 m) and on the Nebelhorn (1832 m) carried out during July-Sept. 1951 were made by means of the KI method. Measurements taken on seven days during which the weather was marked by convective activity were selected for analysis. Intensified convective exchange polished the difference in ozone concentration between these stations. A temporary reversal of ozone gradient is observed when the cumulus condensation level is reached below the mountain station during intense convection. The decrease in ozone concentration at the mountain level is not only caused by the upward transport of air with low ozone content but also may be a result of condensation processes decreasing ozone content. The normal ozone stratification persisted during convection associated with west high pressure situations indicating that subsidence interferes with convective exchange. For the mountain as well as for the valley observations, low ozone values were associated with high relative humidity and vice versa. **Subject Headings:** 1. Ozone measurements 2. Orographic influences 3. Obersdorf, Germany Nebelhorn, Germany.—*I.L.D.*

5.8-88

551.510.42:551.510.53:551.576.1

Jacobs, L., **Dust cloud in the stratosphere.** *Meteorological Magazine*, London, 83(982): 115-118, April 1954. 2 photos, 5 refs. Comment by D. H. JOHNSON, p. 118-119. fig. **WB**—July 27, 1953, a thin sheet of hazy roll-type cloud at 45,000 ft extended over England and S. Scotland (tropopause at 28,000 ft). Cloud persisted until July 30 at heights of 46,000-55,000 ft. Synoptic situation is described; cloud may have been a mixture of ice crystals and dust. Other examples are quoted. **Subject Headings:** 1. Stratospheric dust clouds. I. Johnson, D. H.—*C.E.P.B.*

UPPER ATMOSPHERE—IONOSPHERE

See also: **Advance in study of ionospheric winds** (Manning), 5.8-25; **Average atmos. up to 200 km** (Havens, Lagow), 5.8-38; **Temp. and winds in ozone layer during Oldebroek explosion** (Regula), 5.8-148; **Turbulence spectrum in upper atmos.** (de Jager), 5.8-161; **Winds and turbulent air currents in ionosphere** (Becker), 5.8-177; **Ionizing effect in E layer near sunrise** (Pfiſter), 5.8-272.

5.8-89

551.510.5:551.557

†Faust, Heinrich, **Nullschichteffekt und Frontalzonen.** [Zero layer effect and frontal zones.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(3/4):334-369, 1954. 12 figs., 63 refs. German, English and French summaries p. 334-335. **DLC**—Although below 4 km there is ageostrophic flow from high to low pressure, deep pressure systems may be maintained for weeks by a flow from low to high pressure, with no vertical flow, at about 10 km. This is the "zero layer"; it is also the wind maximum about 1000 m below the tropopause. It is a level of vertical crowding of isotachs resembling the horizontal crowding in a frontal zone. Assuming that convective temperature changes above the tropopause are

greater than and opposed to those below, the zero layer is attributed to opposed circulation above and below a level some way below the tropopause. The sharpening of a front is shown by the same method to be analogous; vertical and ageostrophic motions south of a front zone correspond to those in a closed deep high pressure area, on the north to a closed deep low. The place of the zero layer in the general circulation, the part played by radiation, and the cellular structure of the atmosphere are briefly considered and it is shown that the zero layer also accounts for the planetary west winds. *Subject Heading: 1. Tropopause wind maximum*—C.E.P.B.

5.8-90

551.510

†Chapman, Sydney and Price, W. C., *The upper atmosphere*. *Physical Society of London Reports on Progress in Physics*, 3:42-65, 1936. reprinted 1952. table, 51 refs., eqs. DLQ A literature review summarizing progress from 1922 to 1936. Shows how to utilize balloon thermograph readings, gives calculations of upper atmospheric distribution, discusses sound propagation, the temperature above 50 km, chemical and physical transformation, corpuscular radiation, absorption of solar radiation, etc. *Subject Headings: 1. Upper atmosphere 2. Radiation 3. Literature review*.—A.A.

5.8-91

551.510.53:

Chapman, Sydney, *Upper atmospheric nomenclature*. *I.U.G.G. Association of Meteorology, Brussels*, 1951, *Actes de l'Association*, p. 46-70, publ. 1952. DWB—(See also item 5.4- April 1954, MAB.) The upper atmosphere is classified according to: (a) structure, (b) composition and (c) ion density. Under (a) are included stratosphere and thermosphere; under (b) the hemisphere and heterosphere, and under (c) ionosphere and neutrosphere. The suffix "pause" can be used to designate the upper boundaries of any of these layers: stratopause, mesopause, etc., and "peak" to indicate the level of maximum of any element: mesopeak, ozone peak; and incline or decline the parts above or below the respective peaks: mesodecline. Definitions of them and other terms are given and shown schematically in 3 diagrams. *Subject Headings: 1. Upper atmospheric nomenclature 2. Terminology. I. International Council of Scientific Unions. Joint Commission on the Ionosphere*.—M.R.

5.8-92

551.510

*Kallmann, H. K. (The Rand Corp., Santa Monica, Calif.), *Physical properties of the upper atmosphere between ~80 km and ~250 km*. *Journal of Geophysical Research*, 58(2):209-220, June 1953. 2 figs., 2 tables, 10 refs., 19 eqs. MH-BH—Calculated values of temperature, pressure, molecular weight and density are given in tables and on graphs for each 10 km from 80 km to 250 km. The equations applied to the scanty data available at White Sands, N. Mex. are presented in the text. The theory is based on relation between fractional change in concentration with change of height. It is assumed that molecular oxygen dissociates between 80 km and 120 km and molecular nitrogen between 130 and 250 km, and that a lapse rate of $-2.5^{\circ}\text{C}/\text{km}$ obtains. Calculated pressure and density at 160 km agree closely with rocket data ($T=390^{\circ}\text{K}$). At 250 km T is given as 615°K , $\rho=2.054 \times 10^{-14}$, $P=7.405 \times 10^{-8}$ and $M=14.46$ g/ml. *Subject Headings: 1. Standard atmosphere 2. Physical properties of upper atmosphere 3. White Sands, N. Mex.*—M.R.

5.8-93

551.510

Argence, E. and Mayot, M., *Méthode de détermination des hauteurs vraies des couches de l'ionosphère, compte-tenu de l'action du champ magnétique terrestre. I. Utilisation d'une expression approchée de l'indice de refraction (cas du rayon ordinaire)*. [Method of determination of true heights of ionospheric layers taking account of the action of the geomagnetic field. I. Use of an approximate expression for the index of refraction (case of ordinary ray)]. *Journal of Geophysical Research*, 58(2):147-165, June 1953. 6 figs., 2 tables, 19 refs. In French; English summary p. 147. MH-BH—An approximate formula is used for the refractive index of an ionized medium influenced by the earth's magnetic field in order to establish new relations for characteristic parameters of an ionosphere where ionization follows the parabolic law. Results are compared with those obtained by using APPLETON's method. The correction derived in this manner (for layer thickness) agrees with corrective terms.

SHINN and WHALE. Thicknesses are always smaller than when calculated by classical methods of APPLETON, PEKERIS and RYDBECK). *Subject Headings: 1. Ionospheric height determinations 2. Refractive index.*—M.R. (Based on author's abstract.)

5.8-94

551.510.535

Hines, C. O., **Electron resonance in ionospheric waves.** *Nature*, London, 173(4414):1087-1088, June 5, 1954. 5 refs., 6 eqs. **DLC**—Travelling disturbances in the ionosphere are regarded as resonance of electron oscillations in hydrodynamic waves. Analysis of large-scale F2 disturbances gives scale-height values increased by 40 km or more. Small-scale disturbances above the F2 maximum, causing radio star scintillation, must be propagated very nearly across the geomagnetic field, and a wind hypothesis for such motions is probably untenable. *Subject Heading: 1. Ionospheric disturbances.*—C.E.P.B.

5.8-95

551.510.535

Jenkins, J. B. and Ratcliff, G. (both *Univ. College, Swansea*), **The investigation of ionospheric absorption by a new automatic method, Pt. I. Measurements on vertical-incidence pulse signals.** *Electronic Engineering*, London, 25(302):140-145, April 1953. **Pt. II. Measurements on oblique-incidence broadcast signals.** *Ibid.*, 25(303):189-190, May 1953. 12 figs., ref. **DLC**—In Pt. I the present manual method of measurement of ionospheric absorption is discussed and it is shown that the method suffers from several drawbacks. A new equipment is described which carries out the measurements automatically and this system is shown to be far superior to the manual system. The new equipment produces a permanent record in the form of a pen recording. It is anticipated that the equipment might find application in other fields where the pulse method is used. In the second article the method of ionospheric investigation using oblique-incidence broadcast signals is discussed, and it is shown that certain parts of the equipment described in Pt. I may also be used to make automatic measurements of this type. The equipment produces greatly improved records. Its use in the investigation of ionospheric winds is forecast and its general value as a curve-smoothing device is anticipated. *Subject Heading: 1. Ionospheric absorption measurement.*—Authors' abstract.

5.8-96

551.510.535:551.594.7:681.1

Johnson, Walter E., **Analogue computer for the solution of the radio refractive-index equation.** *U. S. National Bureau of Standards, Journal of Research*, 51(6):335-342, Dec. 1953. 7 figs., table, 5 refs. **DWB**—The solution to the radio refractive-index equation provides information necessary to the research worker studying tropospheric radio propagation in the very high and ultrahigh regions. Present means of computation are either time consuming or of low accuracy. An analogue computer is developed to solve this equation by utilizing basic computation circuits incorporated into a null-balance bridge circuit. A unique feature of this computer is the modification of a linear 10-turn potentiometer so that its output to input voltage ratio versus rotation closely approximates the exponential-type curve of the saturated water-vapor term in the refractive-index equation. This computer is now in use at the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colo., and has superseded other methods of calculating the radio refractive index. *Subject Headings: 1. Analog computers 2. Tropospheric propagation 3. Refractive index.*—Author's abstract.

5.8-97

551.510.535:551.594.12:621.396

*Kelso, John M. (*Pa. St. Coll. Ionosphere Res. Lab.*), **Procedure for the determination of the electron density in the ionosphere.** Pennsylvania. State College. Ionosphere Research Laboratory, Contract AF 19(122)-44, Basic Ionospheric Research, Technical Report, No. 19, Feb. 20, 1951. 21+14+20 p. fig., table, 11 refs., 42 eqs. Also: Remarks on Kelso's paper by Manning, L. A. (*Radio Propagation Lab., Dept. of Electr. Engineering, Stanford Univ.*), **Discussion of the Kelso paper on "A procedure for the determination of the vertical distribution of the electron density in the ionosphere,"** *Journal of Geophysical Research*, 58(1):117-118, March 1953. And also by SHINN, D. H. *Ibid.*, 58(3):416-418, Sept. 1953. For abstract of original paper published in *Journal of Geoph. Research*, see item 4.5-89, May 1953, *MAB*. **DWB**—1) Author determines the "true height of reflection" of a radio wave incident vertically

on the ionosphere, with a method based on the Gauss-Christoffel quadrature formula (discussed thoroughly) and used for the numerical integration of the integral for "true height" as function of group height. Four restrictions on the integrals are listed as they apply to the present work. 2) MANNING points out that KELSO's method of computing the electron density in the ionosphere by a numerical integration of vertical height and frequency data gives results no different from those which would be obtained by simple averaging of equally weighted evenly spaced ordinates. SHINN further shows that although KELSO's method gives good results for integrating such empirically derived data, it is not as accurate as KELSO claims, and shows special cases where the error would be larger. *Subject Headings:* 1. Ionosphere 2. Ionospheric electron density computation 3. Radio wave propagation 4. Gauss-Christoffel quadrature formula. I. Manning, L. A. II. Shinn, D. H. III. Pennsylvania, State College Ionosphere Research Laboratory IV. Contract AF 19(122)-44.—*M.R., W.N.*

5.8-98

551.510.535:551.590.

Naismith, R., A subsidiary layer in the E region of the ionosphere. *Journal of Atmospheric and Terrestrial Physics*, 5(2):73-82, May 1954. 6 figs., 10 refs. DWB—Echoes from E layer at vertical incidence can be separated into E (due to UV ionization), Em (meteor) and Es (sporadic meteors). The fE_m (highest frequency as observed at Slough) echoes are described (the photos referred to in the text are not reproduced). Seasonal and diurnal variations of fE_s (mostly due to fE_m) are plotted. Observations at oblique incidence show a fairly defined ionized layer at 90-100 km giving consistent reflection suitable for regular radio communication over a few hundred km. *Subject Headings:* 1. E layer 2. Meteoric influences.—*C.E.P.B.*

5.8-99

551.510.535:551.590.24:550.3

Sen Gupta, Prabhat K. and Mitra, S. N., Corpuscular eclipse in the F_2 -layer and its association with solar flares and M-regions. *Nature*, London, 173(4409):814-816, May 1954. fig., 20 refs. DWB—Eclipse of a solar corpuscular stream about 2 hours before optical eclipse shows that fast corpuscles have velocities about 1600 km/s, but fade-outs are rare connected with solar flares. M-storms may be due to corpuscles taking 1-3 days to reach earth according to intensity. S. N. MITRA found two corpuscular eclipses $2\frac{1}{2}$ and 5 hr before optical eclipse of Feb. 25, 1952 indicating speeds of 1300 and 640 km/s. Magnetic and ionospheric disturbances on Feb. 23-25 are attributed to corpuscular streams associated with M-regions. *Subject Headings:* 1. Solar activity 2. Magnetic storms 3. Ionospheric disturbances 4. Eclipse phenomena.—*C.E.P.B.*

5.8-100

551.510.535:551.590.

Skinner, N. J.; Brown, R. A. and Wright, R. W., Multiple stratification of the F-layer at Ibadan. *Journal of Atmospheric and Terrestrial Physics*, 5(2):92-100, May 1954. 7 figs., 9 refs. DWB—Phenomena associated with midday minimum of $f_o F_2$ at Ibadan, Nigeria, 1951-53, are discussed. "Ridges" or thick layers are most frequent at 10 h with a second maximum at 15 h. There is a marked seasonal variation. Rate of ridge formation at Ibadan is greatest when moon is 2 and 17 days old. Ridges were also observed in F layer with peak frequency 12-15 h, unrelated to F2 ridges. A tentative explanation by oscillatory ionospheric vertical drifts is given. *Subject Headings:* 1. F layers 2. Lunar effects.—*C.E.P.B.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: New tephigram (Saucier, Elliott), 5.8-30; Determination of evaporation from large areas by horizontal advection in free atmos. (Möller), 5.8-184.

5.8-101

551.511:532.5 551

Bolin, Bert (*Stockholm Univ.*), The adjustment of a non-balanced velocity field towards geostrophic equilibrium in a stratified fluid. *Tellus*, Stockholm, 5(3):373-385, Aug. 1953. 6 figs., 8 refs. MH-BH—The previous work by ROSSBY and CAHN on the adjustment of a non-balanced velocity field towards geostrophic equilibrium has been generalized to

incorporate the corresponding process in a stratified but incompressible fluid. It is shown that the character of the process essentially depends upon the width of the current, the velocity profile in the vertical and the vertical density gradient. As long as the vertical density is small the adjustment of the mean motion of the fluid ($\int_0^{D_0} U dz$) exactly corresponds to the one described by CAHN. On the other hand vertical variations of the unbalanced motion will set up internal oscillations which have considerably larger (vertical) amplitudes than is found for the adjustment of the mean motion. Furthermore, the speed of propagation of the gravity inertia waves thus generated (c_K) is considerably smaller than that of the waves generated during the adjustment of the mean motion (c_0). For values of the vertical density gradient as found in the oceans $c_K < 0.05 c_0$. In the final state of equilibrium the mean motion of the fluid will be approximately the same as before the adjustment, while a considerable smoothing of the vertical gradients of the velocity field will take place, the more the broader the original current is. *Subject Headings:* 1. Fluid dynamics 2. Gravity waves 3. Ocean currents.—*Author's abstract.*

5.8-102

551.511:551.551

Cramer, Harrison E. (*Round Hill Station, Mass. Inst. of Tech.*), Preliminary results of a program for measuring the structure of turbulent flow near the ground. *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 19:187-205, Dec. 1952. figs., 11 refs. DWB—Measurement results for the microvariations of wind speed and direction at a standard height of 2.5 m over sand in a large field are reported. Frequency distributions of the variations are shown to obey the normal error law. The mean intensity of turbulence was about 0.25. The transverse and longitudinal scales of turbulence are shown by incomplete correlation figures; gradients of wind speed for short period fluctuations are discussed. *Subject Headings:* 1. Turbulence spectrum 2. Wind fluctuations 3. Turbulence correlation functions.—*A.A.*

5.8-103

551.511

Cressman, George P., An approximate method of divergence measurement. *Journal of Meteorology*, 11(2):83-90, April 1954. 22 figs., 11 refs., 5 eqs. MH-BH—The vorticity equation for horizontal motion is written as $\nabla_H \cdot v = v_T \nabla_H \ln \eta$, giving horizontal divergence as the product of (v_T) the vector wind difference between the level in question and 600 mb, and $\ln \eta$, the absolute vorticity at the level required. Computations with this equation from 850 and 600 mb charts are shown for eastern U. S. Tornadoes on June 8-9, 1953, were associated with computed lines of maximum convergence at 850 mb. Heavy rain in Kansas on July 11, 1951, fell in a convergence center, the computed maximum rate of 6 in./day agreeing with the observed rate. A method of application of the divergence equation to daily forecasting is suggested. *Subject Headings:* 1. Divergence computations 2. Vorticity theory.—*C.E.P.B.*

5.8-104

551.511:531.65

Fjörtoft, Ragnar (*Univ. of Copenhagen*), On the changes in the spectral distribution of kinetic energy for two dimensional nondivergent flow. *Tellus*, Stockholm, 5(3):225-230, Aug. 1953. 49 eqs. MH-BH—Total kinetic energy as well as total vorticity squared are integral quantities which cannot change in the course of time in a two-dimensional flow of a homogeneous, nondivergent, and inviscid fluid when the fluid is isolated from the surroundings. The case is considered where the fluid is defined over the total region of the surface of a sphere. The nature of the changes in time of the spectral distribution of kinetic energy is discussed on the basis of the two conservation requirements mentioned above. It is found that only fractions of the initial energy can flow into smaller scales and that a greater fraction simultaneously has to flow to components with larger scales. The upper limits to the flow of kinetic energy into components with scales less than a given one are found. The conservation theorems are also used to discuss the stability of a certain stationary flow for a two-dimensional motion which is not necessarily spherical. It is shown how important it is for the proof of stability that not only the kinetic energy of the disturbance is supposed to be small but also its vorticities. In chapter II molecular viscosity is taken into account for the spherical flow. Finally, some conclusive remarks are offered regarding the fundamental difference between

two- and three-dimensional flow. *Subject Headings: 1. Energy transport 2. Vorticity theory*
—*Author's abstract.*

5.8-105

551.511:551.515:551.551

Lorenz, Edward N. (*Mass. Inst. of Tech.*), **The interaction between a mean flow and random disturbances.** *Tellus*, Stockholm, 5(3):238-250, Aug. 1953. 10 refs., 36 eqs. **MH-BH**—The study of the statistical properties of ensembles of hydrodynamical systems may be called statistical hydrodynamics. It is recommended that statistical hydrodynamics be applied to certain problems which have not previously been looked upon as statistical problems. Statistical hydrodynamics is applied to the problem of the interaction between a mean flow and a superposed disturbance, in a two-dimensional homogeneous incompressible nonviscous fluid. The ensemble of all disturbances which may individually be superposed upon a given mean flow is assumed to be random, in the sense that it is unaltered if each disturbance is subjected to a change of sign, a translation in space, or a rotation. It is found that, ensemble average-wise, kinetic energy is transferred from the disturbances to the mean flow if the mean flow is of small variance and coarse detail and the disturbances are on the average of large amplitude and fine detail, while kinetic energy is transferred in the opposite direction if the opposite situation exists. This result is applied to the problem of the maintenance of kinetic energy in the earth's atmosphere against the dissipative effect of friction. There is some evidence that both the total kinetic energy and the kinetic energy of the mean flow can be maintained through the addition of new disturbances which form random ensembles, but that they can be maintained more efficiently, and probably are maintained, by the addition of new disturbances with a systematic lack of randomness. *Subject Headings: 1. Energy balance 2. Atmospheric disturbances 3. Frictional effects.*—*Author's abstract.*

5.8-106

551.511

Priestley, C. H. B., **Buoyant motions and the open parcel.** *Meteorological Magazine*, London, 83(982):107-114, April 1954. 2 figs., 8 refs., 7 eqs. **MH-BH**—An open parcel is a moving mass of air of constant size subject to continuous mixing with surrounding air through bombardment with smaller scale turbulence. Equations of motion and temperature are derived. Five basic modes of single cell convection are defined: oscillatory, asymptotic, absolutely buoyant and two transitional forms, and relations to cloud behavior are discussed. The open parcel theory is then applied to heat transfer from ground to air on sunny days, and to parcels of hot air in a stable layer. The size of parcel for which the upward heat flux is a maximum is defined and maximum flux calculated. *Subject Headings: 1. Convection 2. Open parcels 3. Entrainment.*—*C.E.P.B.*

5.8-107

551.511:551.515

Priestley, C. H. B. (*Commonwealth Scientific and Ind. Res. Organization, Melbourne, Australia*), **Atmospheric turbulence in the boundary layer—an appraisal of the present position.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 19:48, Dec. 1952. fig., 17 refs. **DWB**—The profile approach in atmospheric turbulence problems has its definite limitations and the main efforts should be directed to the measurement of "integral effects" including the microstructure of wind and temperature fluctuations. Some measurements of autocorrelation functions are reported, showing also the correlation of turbulent fluctuations at various levels. *Subject Headings: 1. Turbulence research 2. Turbulence measurement.*—*A.A.*

5.8-108

551.511:551.515

*Rao, K. Nagabhushana, **Equivalent and equivalent potential temperatures.** *Indian Meteorological Dept., Memoirs*, 29(5):173-229, 1953. 8 tables, 21 refs., numerous eqs. **DF**—The major works on equivalent (E.T.) and equivalent potential temperature (E.P.T.) since 1905 (KNOCHE, HANN, NORMAND and others) are reviewed and the theory set forth in the first chapter. Chap. II gives equations for E.T. and E.P.T. for any value of pressure, temperature, relative humidity or mixing ratio. Chap. III gives an evaluation of the expression $\frac{Le\chi_{273}}{273 C_p}$ which frequently occurs in equations for T_E and θ_E . Section IV gives comparison

between T_E and θ_E . Section V is a comparison using ROSSBY's constants on one hand and the author's on the other. Chap. VI gives expressions and data for θ_E in terms of wet bulb temperature and Chap. VII θ_E and entropy. In section VIII and IX are given the derivations and the tables for all the various constants and terms used in the paper and a nomogram. **Subject Headings:** 1. Equivalent temperatures 2. Equivalent potential temperature 3. Computation tables 4. Nomograms.—*M.R.*

GENERAL CIRCULATION

See also: S. Hemisphere Project (S. Africa Weather Bureau), 5.8-33; Criteria for movement and development of waves in westerlies (Gleeson), 5.8-68; Causes of disintegration of stationary anticyclones in Europe (Kletter), 5.8-123; Artificial atomic radioactive aerosols as markers for met. current investigations (Herbst, others), 5.8-276.

5.8-109

551.513(213)

Gordon, A. H. and Shaw, P. M., Application of particle dynamics to derive a general circulation in low latitudes. *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(3/4):319-333, 1954. fig., 5 tables, 12 refs., 24 eqs. English, German and French summaries p. 319-320. **DLC**—Air trajectories are constructed for certain steady but positionally varying pressure gradients. The atmosphere is divided into horizontal layers and motion in each layer is considered independently, assuming nonviscous two-dimensional flow. The equations of motion under a constant meridional pressure gradient with varying Coriolis force are solved for steps of 5°lat . Plotted trajectories show belts of convergence near equator. These are interpreted physically in terms of actual motion, leading to a theory of formation of subtropical anticyclones, which is tested against the North Atlantic anticyclone. **Subject Headings:** 1. Zonal circulation 2. Anticyclogenesis.—*C.E.P.B.*

5.8-110

551.513.1 551.513.2:551.524.7

Defant, F., Über den Mechanismus der unperiodischen Schwankungen der allgemeinen Zirkulation der Nordhalbkugel. [On the mechanism of the non-periodic oscillations of the general circulation of the Northern Hemisphere.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(3/4):253-279, 1954. 13 figs., 11 refs. German, English and French summaries p. 253-256. Also: Über charakteristische Meridionalschnitte der Temperatur für High and Low Index-Typen der allgemeinen Zirkulation und über die Temperaturänderungen während ihrer Umwandlungsperioden. [On characteristic meridional sections of temperature for high- and low-index types of the general circulation and on the temperature changes during their reversal periods.] *Ibid.*, p. 280-296. 8 figs., 4 refs. German, English and French summaries p. 280-282. **DLC**—Transition from low to high index circulation in winter 1951/52 began with increase of pressure and warming of whole troposphere above subtropical W. Atlantic. This spread round the N. Hemisphere as a large-scale warm wave, breaking up the cold tongues or troughs (cut-off process). Similar but less intense warm advances occurred in the W. Pacific. The final result was a contraction of the circumpolar whirl towards higher latitudes with considerable cooling of the polar atmosphere. The change from high- to low-index began with outbreaks from the polar cold dome, transferring cold air to N. E. Siberia, N. E. Canada and N. Europe. These cold tongues were separated by warm tongues from the south. There was marked meandering of the jet stream, with a mean position displaced southwards, and warming of the polar regions. The temperature changes are illustrated by Ellesmere Is. radiosondes. This cycle offers possibilities for extended forecasting. In the second paper daily meridional temperature profiles are drawn for $0-9^\circ\text{km}$, $30-30^\circ\text{N}$ for typical high- and low-index days. The high-index profiles, averaged round the earth, are clear-cut and definite. The low-index profiles are drawn separately for the cold and warm tongues. The temperature changes from high- to low-index bring out the warming of the polar cap by advection from lower latitudes followed by subsidence, and the cooling in cold centers mainly in $65-75^\circ\text{N}$. The change from low to high index (whole hemisphere) shows cooling near the pole and warming between about 50° and 70°N . **Subject Headings:** 1. Meridional exchange 2. Temperature profiles 3. Northern Hemisphere.—*C.E.P.B.*

5.8-111

551.513.2:551.5

*U. S. Bureau of Aeronautics (Navy), **Operational research into the detailed structure of the jet stream.** Project AROWA (TED-UNL-MA-501, Task 15), Technical Report No. [1953]. 28 p. 10 figs. **DWB**—Two jet planes were flown through the jet stream on several occasions in order to determine the fine structure and other physical details of the high level wind maximum in the vicinity of the Allegheny Mountains. Flights were initiated at Patuxent, Maryland. Details of temperature, wind and gust measurement equipment installed in the planes, and of the flight procedures and some of the preliminary results are described and illustrated. A jet stream maximum over Pennsylvania forecast as 160 knots for Feb. 1953, turned out to be 254 knots with anticyclonic shear >3 times that considered theoretically possible. Multiple jet "fingers" were verified. (See also item 4G-129, July 1953, *MA*) **Subject Headings:** 1. Jet stream structure 2. Jet stream data 3. Eastern United States 4. Pennsylvania. I. Project AROWA (TED-UNL-MA-501, Task 15).—*M.R.*

ATMOSPHERIC DISTURBANCES

See also: **Tropical hurricanes** (Bergeron), 5.8-2; **Thunderstorms and squalls** (Kolobkov), 5.8-4; **Vertical energy distribution in atmos.** (Sinz), 5.8-31; **Energy content of air masses . . .** (Sonntag), **Interaction between mean flow and random disturbances** (Lorenz), 5.8-105; **Zonal wind, winter 1950/51** (Seshimo), 5.8-180; **Cloud streets and funnel cloud** (Feteris), 5.8-200.

5.8-112

551

Watanabe, T., **On the trajectory of air particle accompanying a moving cyclone and a cyclone in a linear pressure field.** *Journal of Meteorological Research*, Tokyo, 4(8):563-570, Nov. 1952. 4 figs. In Japanese; English summary p. (35). **MH-BH**—A formula for obtaining a relative stream line in terms of velocity components, the vertical component of absolute vorticity and the distance from the pressure center, is developed under assumption of a stationary circular pressure system moving with constant velocity components in a linear pressure field or constant wind field of a homogeneous and incompressible atmosphere. From the relative stream line thus obtained, the trajectory of an air particle is then derived graphically. An example of the practical application of this method of analysis is offered. **Subject Heading:** 1. Air trajectories.—*G.T.*

5.8-113

551.515.11:551.515.11

§Meyer, Hans Klaus, **Der Einfluss des vertikalen Impulsaustausches auf synoptische Druck- und Temperaturgebilde.** [The influence of vertical exchange of momentum on synoptic pressure and temperature formations.] *Germany. Deutscher Wetterdienst, Berlin* No. 2, 1953. 27 p. 15 figs., 29 refs. **DWB**—Deals with the effect of vertical exchange of momentum on upper and lower cyclones. The basis of the discussion is the decrease of the vertical velocity gradient by convection. A cold low over warm water or land occludes only slowly, a warm low over warm water or a cold low over very cold land occludes very rapidly. Furthermore, the modification of upper lows is discussed as well as the effect of vertical exchange on the front and back side of cyclones. A number of synoptic cases showing sea level pressure and relative topography illustrate the point. Temperature difference between the ocean and air is proposed as a numerical indicator for the intensity of convective vertical exchange. The author concludes that the underlying surface is more important for the change of pressure formations than processes in the upper ionosphere and stratosphere. **Subject Headings:** 1. Vertical exchange of momentum 2. Convection 3. Air mass modification.—*A.A.*

5.8-114

551.515.11:551.515.11

Ramaswamy, C. and Bose, B. L. (*Met. Office, Calcutta Airport*), **On cold pools and their role in the development of northwesterly winds over west Bengal and eastern Pakistan.** *Current Science*, Bangalore, 22(4):103-105, April 1953. 3 figs., 15 refs. Also: Malurkar, S. L. (*Coastal Observ., Bombay*), **Remarks on a note on "development of northwesterly winds, etc."** *Reply to Ramaswamy, C. and Bose, B. L.* *Ibid.*, 22(7):200-201, July 1953. 5 refs. **DWB**—The existence of a cold trough aloft over Northeast India is illustrated by the distribution of winds at 2000 and 5000 ft, the thermal winds and the relative topography 700-500 mb.

situation is usually connected with severe thunderstorms and northwesterners of tornadic violence. The advection of colder air between 10,000 and 20,000 ft seems to be the final determining factor in the outbreak of these winds. 2) The author quotes a number of passages from his previous publication (1943-1949) where he pointed out the importance of an influx of potentially colder air (from N or NW) to replace warm air over India, in the occurrence of thunderstorms over India or northwesterners over the Bay of Bengal; these remarks were overlooked by RAMA-WAMY and BOSE. The latter point out in their reply that MALURKAR did not give any synoptic or aerological evidence that advection of cold air was responsible for development of Bengal cyclones. The present authors have, however, produced a technique for detecting such advection. *Subject Headings:* 1. Cold lows aloft 2. Northwesterners 3. Bay of Bengal 4. Northeast India 5. India. I. Malurkar, S. L.—A.A., M.R.

5.8-115

551.515.11

§Rosenbloom, Abe and Robinson, Earl F. (WBAN Analysis Center, Wash., D. C.), Some aspects of cyclogenesis in the Great Lakes Region, September 11-12, 1953. *Monthly Weather Review*, 81(9):309-317, Sept. 1953. 14 figs., table, 7 refs. MH-BH—A case of marked cyclogenesis in the Great Lakes Region is studied by means of graphs of thickness between standard levels for the period Sept. 11 to Sept. 15, 1953. The contribution to the cyclogenesis at each level of the atmosphere above the storm is thus vividly illustrated. The 200 mb surface showed a marked and steady drop in height through the entire period, indicating that this level furnished a great deal of the pressure drop. All other levels except the 1000 mb showed "no contribution and very little compensation." Similar analysis of thickness changes over a point (S. Ste. Marie), using layers of equal thickness instead of arbitrary pressure levels, showed the 250 to 177 mb layer contributing the most to the surface cyclogenesis. Cross sections show marked lowering and warming of tropopause in Lakes region. Objective forecasts using Fjörtoft method gave poor results as shown by forecast and verification charts. Fjörtoft method proved better though not quantitative. *Subject Headings:* 1. Synoptic studies 2. Cyclogenesis 3. Tropopause warming 4. Great Lakes Region, U. S.—M.R.

5.8-116

551.515.13(02)

Vowinkel, E., Zyklonenbahnen und zyklonengenetiche Gebiete der Suedhalbkugel. [Cyclone tracks and cyclogenetic regions of the Southern Hemisphere.] *South Africa. Weather Bureau, Notos*, 2(1/2):28-36, 1953. 6 figs. DWB—Cyclogenetic regions and cyclogenetic tracks were determined on the basis of two years synoptic Southern Hemisphere maps. An analysis of cyclogenetic frequency per month per five degree equatorial field showed that: 1) the zone influenced by the South American continent (between 120°W and 10°W longitude) is characterized by a greatly diminished cyclogenesis in its western part and correspondingly increased cyclogenesis in the northern part and 2) the African-Australian sector is characterized by a uniform distribution of cyclogenesis. The frequency of cyclogenesis is only 12% greater in the former zone. The distribution of cyclogenesis is more uniform in the Southern than in the Northern Hemisphere, but the absolute maximum is at latitude 42° in both hemispheres. The cyclone tracks of all regions are in general parallel and the depressions move in a ESE direction towards the polar region where they disappear in the sub-antarctic low. The tracks of the Australian region are characterized by a much steeper southern component. Charts showing the frequency of cyclogenesis and cyclone paths are given. *Subject Headings:* 1. Cyclogenesis 2. Cyclone tracks 3. Southern Hemisphere.—I.L.D.

5.8-117

551.515.2

Srinivasan, V. (Met. Off., Santacruz, Bombay), Variation of cyclonic circulation with height in September 1951 deep depression. *Indian Journal of Meteorology and Geophysics*, (3):263-264, July 1953. 2 figs., ref. MH-BH—The parameter "contour anomaly" (see item 3.7-106, July, 1952, MAB) is used to study the circulation in a tropical cyclone (entering N. India from Burma, Sept. 10-12, 1951) from the surface to the 200 mb level. This information is more comprehensive than that from pilot balloon observations which do not usually reach the upper levels of a cyclone. As in the "Kitty" typhoon and Florida hurricane, the contour anomaly was nearly constant in the lower layers, but instead of decreasing in the higher layers as it did in the former, it increased rapidly from 5 to 12 km, indicating the circula-

tion intensity also increased up to 12 km height. *Subject Headings:* 1. Contour anomalies 2. Tropical cyclone circulation 3. India.—*M.R.*

5.8-118

551.515.4(234.3)

*Bouët, Max, *La fréquence des orages dans les Alpes de la Suisse Occidentale*. [Frequency of thunderstorms in the Alps of western Switzerland.] *Geofisica Pura e Applicata*, 25:135-140, 1953. fig., 2 tables, 4 refs. Italian and English summaries p. 135. **MH-BH**—On the basis of personal observations made over a period of years in the western Alps of Switzerland the author constructed a profile of thunderstorm frequency for this region using data for Lausanne, Leyrin, Montana, Sion and Evallène. The number of days with thunderstorms was found to be greater than that generally admitted; they diminish towards the interior of the Alpine massif as far as the most southern chain. The characteristics of Alpine thunderstorms are discussed and data on hourly, diurnal and annual thunderstorm activity at Valvis are given. *Subject Headings:* 1. Thunderstorm frequencies 2. Mountain observations 3. Thunderstorm data 4. Swiss Alps.—*I.L.D.*

5.8-119

551.515.4(8)

*Coile, R. C. and Culmsee, W., *Note on thunderstorm at high altitudes in the tropics*. *Journal of Geophysical Research*, 59(2):280-281, June 1953. fig., table. **DWB**—Frequency of thunderstorms each month from 1931 through 1939 at Huancayo Magnetic Observatory, Peru (11,000 ft), is tabulated showing that an average of 105 (varying from 56 in 1933 to 141 in 1937) storms occur each year, compared with estimate of 42.6 per year for the distribution (Brazil, Bolivia and Peru) made by C. E. P. BROOKS in his famous 1925 monograph on the distribution of thunderstorms over the globe. Graph shows annual curves of thunderstorm frequency for Quito, Huancayo and for Brazil, Ecuador and Peru. More information on tropical thunderstorm frequencies needed. *Subject Headings:* 1. Thunderstorm frequencies 2. Huancayo, Peru 3. Quito, Ecuador. I. Brooks, C. E. P.—*M.R.*

5.8-120

551.515.4:551.594

Mason, B. J., *Electricity generation in thunderstorms*. *Discovery*, 15:24-28, Jan. 1949. 2 figs., 7 refs. **DLC**—The structure of a thunderstorm cell and charge distribution (upper-middle- and lower-charge) are described clearly with a diagram. The mechanism of lightning flash and generation of charge are set out quantitatively. Previous theories of charge generation are discussed. *Subject Heading:* 1. Thunderstorm electricity.—*C.E.P.B.*

5.8-121

551.515.4:523.74

Polli, Silvio, *Attività solare e frequenza dei temporali*. [Solar activity and thunderstorm frequency.] *Geofisica Pura e Applicata*, 25:130-134, 1953. table, refs. Italian and English summaries p. 130. **MH-BH**—For each of twelve European stations between Leningrad and Naples the author determined the annual number of days with thunderstorms and then compared the number of days with thunderstorms for three periods including the year of maximum solar activity with the number of days with thunderstorms during an intermediate three year period. It was found that in northern stations the maximum of thunderstorms is associated with the maximum of solar activity while in southern stations the maximum of solar activity is associated with a minimum of thunderstorm. In the intermediate stations there is a combination of these extreme features. *Subject Headings:* 1. Thunderstorm frequencies 2. Solar activity 3. North Central Europe 4. South Central Europe.—*I.L.D.*

5.8-122

551.515.711

Hovmöller, E., *Life-history of a warm Arctic High in winter*. Chicago. Univ. Dept. of Meteorology, Contract N6ori-20, Task Order 2, Project NR 082 003, Technical Report (unnumbered) May 1953. 15 p. table, 5 refs. **DWB**—A synoptic aerological study of a strong, relatively persistent, warm anticyclone centered over the Canadian sector of the Arctic Ocean during the period Jan. 19-26, 1952." The method of analysis involved the calculation of "D-values" from the height values given in the teletype reports. From the D-values the A-(mean of D-values for 1000 mb-300 mb), B-($D_{300}-D_{1000}$), C-[($D_{300}-D_{700}$)-($D_{700}-D_{1000}$)], E-($D_{300}-D_{100}$), F-($D_{100}-D_{300}$) and G-[($D_{100}-D_{200}$)-($D_{200}-D_{300}$)] values

terminated; from the wind values given in the teletype records, vectors corresponding to each of the above values were computed and four series of maps were constructed. The results of the analysis indicate that the formation of a southeasterly jet may have contributed to the anticyclogenesis. A detailed description of the vertical structure and circulation scheme of the troposphere in the interior of the anticyclone is given. *Subject Headings:* 1. Synoptic meteorology 2. Warm anticyclones 3. Canadian Arctic. I. Chicago. University. Dept. of Meteorology II. Contract N6ori-20, T.O. 2.—I.L.D.

5.8-123 551.515.73:551.513.7
 *Kletter, L., Über die Ursachen des Zerfalls stationärer Hochdrucklagen in Europa. Beispiele echter Steuerung. [On the causes of disintegration of stationary anticyclones in Europe. Examples of true steering.] *Archiv für Meteorologie, Geophysik und Bioklimatologie*, v. A, 6(3/4):297-318, 1954. 8 figs., 3 tables, 11 refs. German, English and French summaries p. 297-298. DLC—Persistent European highs may break down completely in a few days. This process is studied in Aug. 1938 and Jan. 1950. It is attributed to a pressure wave in the Pacific anticyclone advancing northwards to Alaska, where pressure rises rapidly. This releases a cold outbreak over N.W. Canada which travels eastwards to Europe under the influence of the general pressure distribution. This process is termed "True (or genuine) steering" after VON FICKER. *Subject Headings:* 1. Anticyclolysis 2. Steering.—C.E.P.B.

RADIATION AND TEMPERATURE

RADIATION

See also: Absolute light intensity measurement (Parker, Hatchard), 5.8-51; Determination, calculation and short-range forecasting of global radiation (Gräfe), 5.8-75; Ionizing effect in E layer near sunrise (Pfister), 5.8-272.

5.8-124 551.521
 *Linke, Franz, Vorbereitende Betrachtungen. Die Theorie der Zerstreuung, Extinktion und Polarisation des Lichtes in der Atmosphäre. Die Sonnenstrahlung und ihre Schwächung in der Atmosphäre. [Introductory remarks. The theory of scattering, extinction and polarization of light in the atmosphere. Solar radiation and its reduction by the atmosphere.] *Handbuch der Geophysik*, Berlin, 8:1-338, 1942. 118 figs., 51 tables, bibliog. p. 332-338. WB—In the first portion of this monumental "Handbuch," the author has taken up in great detail the factual (theoretical and empirical) knowledge and data on various aspects of radiation from the sun. The solar constant, solar spectrum and its variations, colloidal structure of the atmosphere, radiation laws and theory, details of various types of instruments for measuring radiation and illumination, and methods of measurement and calculation, and a comprehensive list of published data sources on solar radiation in various parts of the earth. Pt. II, Chap. 5 takes up various theories of scattering, extinction, and polarization (RAYLEIGH, MAXWELL, MIE, PLANCK and others), including secondary diffusion. *Subject Headings:* 1. Solar radiation 2. Radiation theory 3. Scattering 4. Light diffusion.—M.R.

5.8-125 551.521.1:621.47
 Conn, Willi M., Recent progress in solar furnaces for high-temperature research and development work. *Franklin Institute, Philadelphia, Journal*, 257(1):1-12, Jan. 1954. 4 p., refs. DWB—Technical details of ten modern solar furnaces, in use at Kansas City, Mo., Meudon and Mont Louis, are specified. General characteristics of large, medium and small furnaces are described. Advantages and disadvantages of solar furnaces as heat sources for high-temperature experiments are discussed. Highest temperature obtainable in a solar furnace with a 120-inch diameter and 34-inch focal length is believed to be 4200°K. *Subject Headings:* 1. Solar furnaces.—G.T.

5.8-126 551.521.1
 *Hand, Irving F. (U. S. W. B., *Solar Rad. Obser., Blue Hill*), Distribution of solar energy over the United States. *Heating and Ventilating*, N. Y., 50(7), July 1953. unpagd. port.,

2 tables, 13 refs. Abstracted from reprint. DWB—For 49 stations in the United States the author gives in a table the normals of the daily receipt of solar energy on a horizontal surface for June and December and for the entire year (Btu/ft²/day), and shows the relations between the annual receipt of solar energy and the hours of sunshine, the average cloudiness, the number of clear days and the percentage of daylight hours the sun shines for the entire year and for Oct.–March. A map with lines of equal amounts of solar radiation in Btu/ft²/day is included. *Subject Headings:* 1. Solar radiation 2. Sunshine duration 3. United States—*I.L.D.*

5.8-127

551.521.1:551.501

Hartmann, W., Über einen Zusammenhang zwischen der direkt gemessenen Sonnenstrahlung und der Globalstrahlung. [On a connection between solar radiation measured directly and global radiation.] *Meteorologische Rundschau*, 7(3/4):54–56, March/April 1950, 6 tables, 13 refs. DWB—Relation between total radiation g (gcal/cm²) in a month of horizontal surface and radiation J_d on a surface normal to sun's rays, is expressed by: $G = A + B \log J_d$, where A and B are constants which vary with locality and are related to sunshine duration or cloudiness. These constants and their errors are given for four German stations. *Subject Headings:* 1. Global radiation 2. Methods of computation.—*C.E.P.B.*

5.8-128

551.521.1:551.524

Sakai, H., On the correlation between sunshine duration and air temperature in winter in Tohoku District. *Journal of Meteorological Research*, Tokyo, 4(10):817–820, Feb. 1951, 2 figs. In Japanese; English summary p. 50. MH-BH—In northern Honshu there are 12 positive correlations between temperature (Dec.–Feb.) and sunshine duration on West coast and high negative correlation on East coast. The coefficients on West coast are largest where continental high is weak; hence, correlation is due to monsoon and this may aid long-range forecasting. *Subject Headings:* 1. Sunshine duration 2. Air temperatures 3. Correlation 4. Honshu, Japan.—*C.E.P.B.*

5.8-129

551.521.11(1)

*Gabites, J. F., The distribution of insolation over New Zealand. *New Zealand Meteorological Office, Circular Note*, No. 81, Nov. 8, 1951. 3 p. 4 refs. DWB—A proposal for a radiation measurement network for New Zealand is outlined, data on estimated mean of totals of radiation falling on vertical surfaces near Wellington are given. *Subject Headings:* 1. Insolation 2. Radiation data 3. New Zealand.—*I.L.D.*

5.8-130

551.521.12(1)

*Ambrosetti, Fl. and Thams, J. C., Die Grösse der Globalstrahlung verschieden orientierter Flächen. [The quantity of global radiation on differently oriented surfaces.] *Geophysica Pura e Applicata*, 26:198–210, 1953. 5 figs., 4 tables, 14 refs. In German; German, Italian and English summaries p. 198. DWB—Measurements of sun and sky radiation were made from Sept. 1950 to Jan. 1953 at Locarno-Monti Airport, with a Moll-Gorczyński solarimeter on the 5 sides of a vertical cube oriented toward the S (S, E, N, W and top), and the results tabulated by months for each side, for the sum of 4 sides and for the whole cube (5 sides). These are compared with totals recorded at Arosa and Davos, for all days and for clear sky respectively and for that received on a horizontal surface. Proportion due to sun and sky radiation was also differentiated. Percentage received on each of the faces for various months was calculated. The results enable ordinary solar radiation data obtained at various places to be converted to data for variously oriented walls or surfaces. *Subject Headings:* 1. Solar radiation data 2. Radiation on variously oriented surfaces 3. Locarno-Monti Observatory, Switzerland.—*M.R.*

5.8-131

551.521.13:551.521.14

Wegener, Kurt, Die Registrierung der Energie-Verteilung im Sonnen-Spektrum. [Recording of the energy distribution in the solar spectrum.] *Geofisica Pura e Applicata*, 26:191–197, 1953. 3 figs., 2 refs. In German; German and English summaries p. 191. MH-BH—It is shown on what theoretical basis it is possible to construct an instrument

accurately records the energy in the various wave lengths of the solar spectrum. The extensive Langley-Abbot instrument is said to give results which are nearly unreproducible. A cheaper instrument is described, which integrates the various lines from a set of prisms and produces a curve for any given solar angle, which shows the total energy (temperature) in the spectrum from $>7620 \text{ \AA}$ to $<3960 \text{ \AA}$. From over 100 records which were made in 1953, for examples of energy distribution curves (for 24° , 40° , 48° and 58° solar angle) obtained at Hafele Kar (2200 m height) near Innsbruck are presented. *Subject Headings:* 1. Solar spectrum 2. Solar spectrum energy distribution 3. Solar constant 4. Solar radiation instruments.—*M.R.*

5.8-132

551.521.3:551.521.61

Migeotte, M. and Neven, L. (*Astrophysical Inst. Liège Univ. and Royal Obser. of Belgium, Liège*). **Recents progrès dans l'observation du spectre infra-rouge du soleil à la station scientifique du Jungfraujoch** (Suisse). [Recent progress in observation of infrared spectra of the sun at the Jungfraujoch Observatory.] *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 12(1/2):165-178, 1952. 5 figs., 2 tables, 18 refs. **DLC**—Report on results of observations of the solar spectrum made in 1950 and 1951 in the 2.8 to 14.18μ region. The apparatus, with which 2450 absorption lines were recorded, is described and the observations grouped to show the location of band centers for CH_4 , N_2O , CO_2 , CO , HDO and O_3 . Due to location of the observatory and technique, results show much more detailed line structure than has been obtained by previous investigators. A few tracings of spectra as obtained at Jungfraujoch and other observatories are reproduced by way of illustrations. *Subject Headings:* 1. Atmospheric composition 2. Infrared absorption spectrum 3. Jungfraujoch Observatory, Switzerland.—*M.R.*

5.8-133

551.521.32:551.588.2

Kondrat'ev, K. IA. and Podol'skaia, E. L., **Effektivnoe izluchenie sklonov**. [Effective radiation from slopes.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaiia*, No. 4:370-375, 1953. 2 figs., 3 refs., 12 eqs. **DLC**—Effective radiation from slopes was observed during air nights, June-July 1952, at the Actinometric Observatory in Karadag (Crimea) and compared with calculations made according to theoretical formulas derived on the assumptions that: 1) the surface of the slope and of the horizontal plain in front of the slope are absolutely black, 2) the temperature on the slope and on the horizontal surface are equal. The limits of applicability of the approximate theoretical formulas to the calculations of the effective radiation from slopes are determined. *Subject Headings:* 1. Radiation from slopes 2. Orographic effects 3. Karadag, U.S.S.R.—*N.T.Z.*

5.8-134

551.521.4

Ashburn, Edward V., **The effect of Rayleigh scattering and ground reflection upon the determination of the height of the night airglow**. *Journal of Atmospheric and Terrestrial Physics*, 5(2):83-91, May 1954. 2 figs., 2 tables, 4 refs., 4 eqs. **DWB**—Tables and graphs are given, based on CHANDRASEKHAR's equations for radiative transfer, for correcting photometric data of night airglow for Rayleigh scattering and for reflection from the ground, for different values of the extinction coefficient and albedo. *Subject Headings:* 1. Night airglow. 2. Chandrasekhar, S.—*C.E.P.B.*

5.8-135

551.521.4 551.521.32

Barbier, Daniel (*Inst. d'Astrophysique and Observ. de Paris*), **L'altitude des couches émettrices du ciel nocturne**. [Altitude of the emission layers of the night sky.] *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 12(1/2):43-56, 1952. 5 tables, 17 refs. **DLC**—Several methods are outlined for measuring the height of the layers where night airglow emissions occur. Difficulties in using the photometric method are enumerated—namely multiple scattering, interference from zodiacal light and superposition of several wave lengths, geographic irregularities, etc. The results, according to various authors, of measurement of height of oxygen, red, Meinel (OH) bands, Herzberg (O_2) bands, Végard-Kaplan (N_2) bands, etc. are tabulated and discussed. *Subject Headings:* 1. Night airglow spectrum 2. Emission layer heights 3. Photometric night airglow measurement.—*M.R.*

5.8-136

Barbier, Daniel, **Résultats d'observations photométriques de la lumière du ciel nocturne** [Results of photometric investigation of the light of the night sky.] *Académie des Sciences Paris, Comptes Rendus*, 238(7):770-772, Feb. 15, 1954. 9 refs. DWB—A new photometer was installed at Haute-Provence Observatory in July 1953. This instrument was used for comparative measurement of intensity variations in 8 different colors of extraterrestrial light over the polar region. It is found that the spectral lines form two groups of covariates (simultaneous occurrence of maximum and minimum intensity), namely, *group A*: [OI] 5892 Å, the continuous spectrum, Herzberg bands, blue radiation; *group B*: OH bands, D-line sodium, red line of oxygen (this latter only during part of the night). Monthly variations show proportionality between the red line of OI and the OH bands are analyzed in particular. *Subject Headings*: 1. Night airglow spectrum 2. Photometric night airglow measurements.—G.T.

5.8-137

Berthier, Pierre, **Correlation entre l'intensité du doublet du sodium et l'intensité de la bande (6,1) de OH pendant la nuit**. [Correlation between the night-time intensities of the doublet of sodium and of the 6.1 band of OH.] *Académie des Sciences, Paris, Comptes Rendus*, 238(2):263-264, Jan. 11, 1954. 4 refs. DWB—Measurements made during the nights of Sept. 19, 20 and 22 and Nov. 12, 15 and 19, 1952, show a striking resemblance between intensity variations of the doublet of sodium at 5892 Å and the 6.1 band of OH at 6470 Å. Intensity values are presented for two nights. The correlation appears to be even closer than was identified earlier in respect of the doublet of sodium and the 6300-6364 Å lines of OI. *Subject Heading*: 1. Night airglow spectrum.—G.T.

5.8-138

Garrigue, Hubert, **Mesures absolues de la brillance du ciel nocturne à grande altitude et comparaisons avec les mesures au sol**. [Absolute measurement of the brightness of the night sky at great heights and comparison with measurements made at the ground.] *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 12(1/2):63-70, 1952. 2 figs., refs. DWB—During 5 nights, observations of night sky brightness in the blue, green and red were made from the plexiglass dome of an airplane at 8500 m (in connection with flights at Bordeaux detecting radioactive clouds at high altitudes) and were compared with earlier results at pilot stations and at mountain and low level stations in France, in order to show the amount of absorption in the lower layers of the atmosphere, and the possible origin of the night sky light. The visual binocular photometry method is described and results charted. *Subject Headings*: 1. Night sky brightness 2. Night airglow measurements 3. Photometric night airglow measurement 4. Bordeaux, France.—M.R.

AIR TEMPERATURE

See also: Equivalent and equivalent potential temp. (Rao), 5.8-108; Characteristic meridional sections of temp. for high- and low-index types . . . (Defant), 5.8-110; Correlation between sunshine duration and air temp. in winter (Sakai), 5.8-128; Summer midday potential temp., specific humidity, thermal energy and wind force profiles . . . (Frankenberger), 5.8-168; Room temp. (Makajanic), 5.8-247.

5.8-139

551.524.1:551.5

Kaps, Egon, **Die Temperaturverhältnisse an der Elbe zwischen Ufer und Deich**. [Temperature conditions on the Elbe between shore and dyke.] *Annalen der Meteorologie*, 6:15-25, 1953/4. 9 figs., 7 refs. German and English summaries p. 15. MH-BH—At Hamburg, S. of Hamburg series of temperature readings at $\frac{1}{4}$ - $\frac{1}{2}$ hr intervals in July on the ground 400 m wide bordering the river Elbe are set out in a series of profiles. At night heights of 5 and 30 cm lowest temperatures were about 120 m from shore until 23 h, then 30-40 m from shore. At 50 cm there was a progressive fall of 1-2°C at night and 1 day from shore to 300 m inland. Hourly observations were made of temperature irregularities at 2 m. Author concludes that at 5 and 30 cm microclimatic conditions predominate.

50 cm with onshore wind influence of river extends 70–150 m inland. Difference 0.5–2 m shows that from 3–14 h stratification is unstable inland but stable on shore; from 15 h–2 h this is reversed. *Subject Headings:* 1. Temperature microvariations 2. River micrometeorology 3. Elbe River, Germany.—*C.E.P.B.*

5.8–140

551.524.3(421)

*Marshall, W. A. L., Mean maximum and mean minimum temperatures as criteria of temperature characteristics of a month. *Meteorological Magazine*, London, 83(932):100–107, April 1954. fig., 7 tables. **MH-BH**—Daily temperatures at Kew, June and July 1953, show prevalence of maxima below but minima above normal; mean daily temperature is unrepresentative. Mean maxima best represent character of a summer month, mean minima of a winter month. Differences of mean maxima, mean minima and mean from normal are tabulated for Kew of each month. Indices 0–9 of character of each month from: 1) daily maxima and 2) daily minima are defined and months classified accordingly. *Subject Headings:* 1. Air temperature variations 2. London, England.—*C.E.P.B.*

5.8–141

551.524.33(471.1):551.590.21

Simojoki, Heikki, Die Periodizität der Wintertemperatur in Stockholm und Helsinki. [Periodicity of winter temperature at Stockholm and Helsinki.] *Helsinki. Universitet. Meteorologian Laitos, Mitteilungen*, No. 73, 1954. 11 p. 5 figs. (1 fold.), table. **DWB, DLC**—As a result of a periodogram analysis of winter temperature at Stockholm (1756–1950) and Helsinki (1832–1951) several periodicities (approx. 5, 8, 14, 24, 26, 36 yrs and over) are identified and compared with sunspot activity. The mathematical methods used in the analysis are specified. *Subject Headings:* 1. Winter temperatures 2. Temperature periodicities 3. Sunspot effects 4. Helsinki, Finland 5. Stockholm, Sweden.—*G.T.*

5.8–142

551.524.34(269)

Prohaska, F., Bemerkungen zum säkularen Gang der Temperatur im Südpolargebiet. [Remarks on the secular change of temperature in the South Polar regions.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 5(3/4):327–330, 1954. fig., 4 refs., German, English and French summaries p. 327. **DLC**—The conflicting views of the author, H. C. WILLETT and R. SCHERHAG on secular warming of the south polar regions are discussed. Author concludes that apparent warming is due to incomplete data; long records south of 40°S, typified by S. Orkneys, show fluctuations but no progressive warming. *Subject Headings:* 1. Temperature trends 2. Antarctica.—*C.E.P.B.*

5.8–143

551.524.36:551.524.4

Sauberer, F. and Dirmhirn, I., Über die Entstehung der extremen Temperaturminima in der Doline Gstettner-Alm. [On the origin of the extreme temperature minima in the Gstettner-Alm valley.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 5(3/4):307–326, 1954. 7 figs., 8 refs. German, English and French summaries p. 307–308. **DLC**—The valley (47½°N, 15°E), a depression 150 m deep N.W. of the Dürrenstein massif, is noted for very severe frosts. Some earlier observations are discussed. In Feb.–March 1953 autographic observations were made on snow floor, on slopes at various heights and with resistance thermometers on a fixed balloon; winds were observed with pilot balloons. The low temperatures are due to thermals, stratification in calm air and outward radiation from snow, prolonged by shading by surrounding hills and accentuated by dry air. Cold air accumulates to a depth of 50 m and then drainage from slopes flows away through an outlet at that level. Lowest temperature observed was –32.5°C but –50°C is possible. *Subject Headings:* 1. Minimum temperatures 2. Inversions 3. Frost pockets.—*C.E.P.B.*

5.8–144

551.524.36:551.586:616

Wright, G. Payling and Wright, Helen Payling, The influence of seasonal conditions upon the mortality of infants from bronchopneumonia in the metropolitan boroughs. Extract from paper on: "Etiological factors in broncho-pneumonia amongst infants in London." *Journal of Hygiene*, Cambridge, 44:21–26, 1945–46. 4 figs. **DLC**—A statistical study shows close relations between death in infants under 2 and persons over 55, and temperatures of coldest

day in each week 12-14 days earlier. Deaths rise rapidly when temperature falls below 40°F. *Subject Headings:* 1. Temperature effect on mortality 2. Pneumonia 3. London, England.—C.E.P.B.

5.8-145

551.524.37:632.1

Burckhardt, H., *Frostschutz durch Abriegelung der Kaltluftzufuhr*. [Frost protection by blocking the approach of cold air.] *Umschau*, 54(9):276-278, May 1, 1954. 4 figs., 2 refs. DWB—Frost protection by spraying water was tested in a vineyard at Niederhausen near Neustadt in May 1953. Thermometers and thermographs were installed at many points in the valley (map). On the basis of these, sprayers were resited on upper edge of valley floor and reinforced by a dyke and a fire chain. On May 10-11, when the bottom of the valley fell to 7.5°C, only slight damage occurred in the vineyard. *Subject Heading:* 1. Frost protection.—C.E.P.B.

5.8-146

551.524.37:551.524.4

Lessmann, Helmut, *Singuläre Frostdaten in Südwestdeutschland*. [Frost date singularities in S.W. Germany.] *Meteorologische Rundschau*, 7(3/4):50-54, March/April 1954. fig., 5 tables, 13 refs. DWB—Series of observations up to 70 years were examined for calendar relations of days of air temperature 1°C or less. Daily results for 11 stations May through Sept. are plotted, the statistical reality of maxima and minima being indicated by their ratio to standard deviation. The May maxima are further confirmed by comparison with F. BAUEN's calendar of weather types. The greatest frequencies refer to periods rather than individual days; for agriculture they can only be used in conjunction with weather forecasts. *Subject Headings:* 1. Frost frequencies 2. Temperature singularities 3. Germany.—C.E.P.B.

5.8-147

551.524.4:551.571.4:551.59

Brocks, Karl, *Eine räumlich integrierende optische Methode für die Messung vertikaler Temperatur- und Wasserdampf-gradienten in der untersten Atmosphäre*. [A spatially integrating optical method of measuring vertical temperature and water vapor gradient in the lowest atmosphere.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(3):370-402, 1954. 3 figs., 7 tables, 18 refs., 50 eqs. German, English, and French summaries. p. 370-372. DLC—The theory of obtaining mean values of vertical temperature and humidity gradients over long distances from refraction measurements is set out. The relation between meteorological elements and refraction along the ray is derived, and equations given for altitude functions of refractive index and temperature and humidity gradients, measured along different rays. With suitable apparatus an accuracy of .0005°C/m can be obtained for the vertical temperature gradient. The necessary instruments and the practical applications are described. *Subject Headings:* 1. Vertical temperature gradient 2. Humidity lapse 3. Atmospheric refraction.—C.E.P.B.

5.8-148

551.524.7:551.557:551.510

Regula, Herbert, *Temperaturen und Winde in der Ozonschicht zur Zeit der Oldebroeker Sprengung*. [Temperature and winds in the ozone layer at the time of the Oldebroek explosion.] *Meteorologische Rundschau*, 7(3/4):57-59, March/April 1954. 2 figs., table, 4 refs., 4 eqs. DWB—Temperature and wind profiles of Oldebroek explosions of Dec. 15, 1932, recalculated. Temperature was -57°C at 30 km rising slowly to -48°C at 38 km, then rapidly to +31°C at 48 km. Maximum in ozone layer is estimated as +50° at 50-55 km. Wind speed: 22 m/s at 10.5 km, 17 at 17 km, mean direction 250°. Then increased from 17 m/s and reached 76 m/s at 40 km and probably 80-100 m/s at 50 km. *Subject Headings:* 1. Upper air temperatures 2. Upper air winds 3. Ozone layer 4. Oldebroek explosions (1932).—C.E.P.B.

5.8-149

551.524.7:551.547.1:519.2

Stidd, C. K., *A note on the application of the hydrostatic equation to atmospheric statistics*. *Journal of Meteorology*, 11(2):165-166, April 1954. fig., 12 eqs. MH-BH—Correlation coefficients between temperature T and height h of a pressure surface are influenced by the hydrostatic relation between T and h . This is expressed as: $r_{hT} = \frac{\bar{T}}{\sigma_T} \frac{\Delta \sigma_h}{\Delta z}$; where $\Delta \sigma_h / \Delta z$ is

erage change per meter. This agrees with coefficients from 73 winter soundings up to mb at Honolulu. *Subject Headings:* 1. Relative topography 2. Temperature—height relation.—*C.E.P.B.*

SOIL TEMPERATURE

See also: Water movement and content determination in frozen ground (Weger), 5.8-224.

5.8-150 551.525.2(422)

Lawton, G. O., Abnormal grass minimum temperatures at Abingdon. *Weather*, 9(4):105-106, April 1954. MH-BH—At Abingdon on night of March 2-3, 1953, anticyclonic situation, ground moist, minimum temperatures were: screen 23, grass 27°F; March 3-4 screen 23, grass 25°F. No explanation given. *Subject Heading:* 1. Grass temperatures.—*C.E.P.B.*

5.8-151 551.525.2

Poulter, Robert M., Abnormal grass minimum temperatures. *Weather*, 9(5):144, May 1954. fig. DWB—Grass minima higher than air temperatures are explained by radiation from the surface of a fog layer instead of from the ground. *Subject Heading:* 1. Grass temperatures.—*C.E.P.B.*

5.8-152 551.525.4(569.4)

*Hadas (Vadász), A., Soil temperatures at the evaporation station, Lydda Airport, Israel, 1951-52. *Israel. Meteorological Service, Series A, Meteorological Notes*, No. 9, 1954. 9 p. 9 figs., tables, eqs. DWB—Hourly observations of soil temperature at depths 1-80 cm were made on Aug. 5-7, 1952. Diurnal variations are shown in curves, and fitted by curves based on equation of thermal diffusivity of soil. Thermoisopleths of daily wave of soil temperature are drawn. Annual variation is shown at same depths for 8, 14 and 20 h, annual ranges and lag of extremes tabulated. Discussion includes influence of clouds and heat flux in summer and winter. *Subject Headings:* 1. Soil temperatures 2. Lydda, Israel.—*C.E.P.B.*

5.8-153 551.525.4:632.1

Neumann, J., Some microclimatological measurements in a potato field. *Israel. Meteorological Service, Series C, Miscellaneous Papers*, No. 6, 1953. 8 p. 2 figs., table, 2 refs. (see also 5.8-152). DWB—Observations were made Aug.-Oct. 1949 in soil 15 cm below ridges in potato plots seeded in Aug. in unmulched and strawmulched plots. Under mulched surface maximum temperature was up to 4.8°C lower, and range 3-4° less than under unmulched surface, thus permitting earlier planting. At 10 cm above mulched surface maxima were 1.5 to 6°C higher and minima 1-3° lower than above unmulched surface. *Subject Headings:* 1. Soil temperatures 2. Mulching.—*C.E.P.B.*

WATER TEMPERATURE

See also: Method for measuring water surface temp. during evaporation experiments (Hammecke, Kappler), 5.8-24; Microclimatic investigations on small water areas (Höhne), 5.8-243.

5.8-154 581.54:551.46:551.526.6

Rodewald, Martin, Meeresleuchten und Wassertemperatur. [Phosphorescence and water temperature.] *Wetterloise*, 71:108-111, May 1954. fig. DWB—Sea water temperatures at which strong phosphorescence occurs lie between 24.0 and 25.5°C, in spite of a range of 20-34°C on preceding and following days. Edge of cold upwelling water is especially favorable. *Subject Headings:* 1. Phosphorescence 2. Sea temperatures.—*C.E.P.B.*

5.8-155 551.526.8

Kondracki, Jerzy, Obserwacje nad termiką jeziora Niegocin na stacji naukowej Polskiego Towarzystwa geograficznego w gizycku (1949-1951). [Observations on thermal conditions of Lake Niegocin.] *Poland. Przegląd Geograficzny*, 24(3):49-71, 1952. 6 figs., tables, 7 refs. Polish; Russian and English summaries p. 69-71. DLC—Results of observations of water

temperature and ice conditions of the lake, carried out during the period 1949–1951 at scientific station of the Polish Geographical Society at Gizycko, are presented and discussed. In spite of a greater amplitude of oscillation of the air temperature, water temperature generally higher in summer than the mean air temperature. Characteristic features of thermal conditions are: 1) relatively low position of the thermocline in summer; 2) stratification of the water in winter caused by the shallowness of the lake and its large surface (3–4½ months covered with ice). *Subject Headings:* 1. Heat balance of lakes 2. Limnology 3. Lake Niegocin, Poland.—A.M.P.

5.8–156

551.526.8:551.556:551

Thompson, R. W. S., *Stratification and overturn in lakes and reservoirs*. *Institute of Water Engineers, London, Journal*, 8(1):19–36, Feb. 1954. 9 figs., 8 refs. Discussion p. 52. **DWB**—Author discusses thermal stratification in a freshwater lake or reservoir. typical summer temperature and density profiles are shown and the annual cycle outlined including effect of dissolved substances. If temperature falls below 4°C in winter, surface warming of surface to 4°C causes an overturn. In summer a thermocline forms at a depth with a wind circulation above. In autumn wind circulation occupies the whole depth. Variations of this typical pattern in some British lakes and reservoirs are shown, and applications to water engineering problems referred to. These are further emphasized in a discussion. *Subject Headings:* 1. Lake temperatures 2. Lake circulation.—C.E.P.B.

PRESSURE AND WIND

PRESSURE

See also: Tables of barometric pressure at varying temp. (Ball), 5.8–29; Contour chart accuracy in forecasting upper winds (Murray), 5.8–69; Application of hydrostatic eq. to atmos. statics (Stidd), 5.8–149; Monsoonal pressure and temp. oscillations, their relation with solar activity (Dmitriev), 5.8–167.

5.8–157

551.541:551

Saxer, L., *Über Entstehung und Ausbreitung quasiperiodischer Luftdruckschwankungen*. [On the origin and spread of quasiperiodic pressure variations.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(3/4):451–463, 1954. 9 figs., 16 refs. German, English and French summaries p. 451. **DLC**—Oscillations of pressure with a period of 4–6 h and amplitude .0001 to .001 mm Hg at Aarau, Switzerland, were recorded with apparatus in a glass case. Maximum amplitude in winter and on quiet days at 18–20 h (sunset), minimum at 5–7 h (sunrise). They have no relation to local weather but in winter a clear relation to height of sea waves in N. Atlantic due to storm centers. They are attributed to energy radiated by waves (mean 100 erg/cm²) reflected downwards by an inversion at 30–60 km by the upper W winds in winter. The amplitude frequency distribution agrees with theory for waves of random phase distribution. The amplitude and period variations run parallel with those of microseisms at Strasburg. *Subject Headings:* 1. Microbarometric oscillations 2. Sea waves.—C.E.P.B.

5.8–158

551

James, R. W., *On the propagation of pressure-patterns: Part I and II*. *Geofisica Applicata*, 25:101–122, 1953. refs., eqs. **MH-BH**—The hypothesis is formulated that “changing pressure field may be split up into a general flow invariant in time, and perturbations, which are propagated with undistorted shape.” The propagation speed of sinusoidal troughs and wedges in a steady state flow is determined from considerations of their transport due to the bodily motion of the system. Fundamental propositions are derived concerning the mutual interrelationship of wind, pressure, temperature and density during propagation. It is found that in a frictionless barotropic general flow all perturbations are propagated with the speed of the general current. In a baroclinic general flow a perturbation will only be propagated without dispersion if it has a specific (sinusoidal) horizontal structure. When a sinusoidal perturbation is embedded in a baroclinic general flow

will be propagated as though by a barotropic flow with the same effective speed. In Pt. II the theory of Pt. I is extended to take into account vertical motion and frictional drag. Surface friction is found not to affect appreciably the propagation of troughs and wedges. The speed of a disturbance at the surface is not affected appreciably by the patterns of vertical motion. If the upper part of the perturbation moves at the same speed as the surface wave, a certain pattern of vertical motion is necessary, depending on the morphology of the perturbation and of the mean flow. *Subject Heading: 1. Pressure patterns.—I.L.D. Based on author's abstract.*

5.8-159

551.543.3

Gordon, A. H. (*Met. Office, Harrow, England*), **Seasonal changes in the mean pressure distribution over the world and some inferences about the general circulation.** *American Meteorological Society, Bulletin*, 34(8):357-367, Oct. 1953. 12 figs., 14 refs. **MH-BH**—The monthly charts (prepared in the Meteorological Office) of the mean pressure distribution over the oceans were used to obtain mean pressure values for 2° squares over the oceans and then to calculate the mean monthly pressure tendencies. The marine data were supplemented over land by mean tendencies similarly obtained from pressure data in World Weather Records (1920-1940). Mean isallobars were drawn up for the whole world for each two consecutive months of the year. "The mean tendencies were converted into units of regular change of mass and integrated round the globe for each 10 degrees of latitude, excluding the region south of 50° latitude" and "the net changes in relative mass were plotted as a function of latitude for each month of the year and isopleths drawn." The mean latitude pressure patterns over the oceans, the seasonal change of mass departure from normal and of mean pressure pattern distribution and convergence pattern showing zonal patterns in mass from month to month are shown by means of maps and graphs. The pattern disclosed shows net relative mass divergence and convergence and indicates the magnitude of net exchange of air between the hemispheres. *Subject Headings: 1. Seasonal pressure distribution 2. Atmospheric circulation.—I.L.D.*

5.8-160

551.547

Hutchings, J. W. and Row, Ann L., **Mean thicknesses of standard isobaric layers in the Australasian region.** *New Zealand. Meteorological Office, Circular Note*, No. 61, Aug. 1950. p. 6 figs., 2 tables, 3 refs. **DWB**—The mean thicknesses between standard isobaric surfaces were derived from tabulated heights of 700, 500 and 300 mb and converted into geopotential feet. The data (in geopotential meters and feet) for various stations for summer and winter are given in tables and also presented in the form of charts. *Subject Headings: 1. Standard isobaric surfaces 2. Upper air data 3. Australasia Region.—I.L.D.*

TURBULENCE

See also: Aid to microclimatic observations (Paulus), 5.8-26; Radar echoes from turbulence (Jones), 5.8-34; Measuring structure of turbulent flow near ground (Cramer), 5.8-102; Interaction between mean flow and random disturbances (Lorenz), 5.8-105; Atmos. turbulence in boundary layer (Priestley), 5.8-107; Measurement of natural evaporation over grass (Frankenberger), 5.8-182; Turbulence in clouds, factor in precip. (East, Marshall), 5.8-190; Air conductivity and turbulent mixing in atmos. (Milin, Malakhov), 5.8-273; Fluctuation of sound phase in turbulent medium (Tatarskii), 5.8-285.

5.8-161

551.551:551.510.535

*de Jager, C., **The spectrum of turbulence in the earth's upper atmosphere.** *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 12(1/2):223-252, 1952. 5 figs., 8 tables, refs., 5 eqs. **DLC**—The statistical turbulence spectrum for winds observed in meteor trains at ca. 80 km is derived and shown to obey KOLMOGOROV's law for distances <10 km. At greater distances, deviations are assumed to follow a transition to VON KÁRMÁN's asymptotic law. Two models of atmospheric density and temperature from 70 to 600 km (one from optical and electronic or auroral measurements and one from rocket data) are then used to calculate Reynolds numbers for 80, 100, 150, 200, 300, 400 and 600 km height. Convection plays a very limited role in the atmosphere as a whole. Turbulent motion might be considered as an

additional source of energy for the night airglow. *Subject Headings:* 1. Turbulence in the ionosphere 2. Atmospheric models 3. Night airglow 4. Meteor trails.—*M.R.*

5.8-162

551.551:533

Dmitriev, A. A. and Bochkovskaia, T. V., **K voprosu o turbulentnosti v volne.** [The problem of turbulence in waves.] *Akademiia Nauk SSSR, Doklady*, 91(1):31-33, July 1953. figs., ref., 16 eqs. **DLC**—In the investigation of turbulence in waves it is customary to divide the coefficients of vertical viscosity of air flow and of the simultaneously occurring wind wave and to regard the magnitude of the latter as considerably smaller. In this paper the author shows theoretically and experimentally that in the presence of virtual viscosity mixing occurs also in an infinitely deep fluid owing to the appearance of a vortex which large areas presupposes considerable turbulence. *Subject Headings:* 1. Turbulent flow liquids 2. Turbulence theory.—*I.L.D.*

5.8-163

551.

Halstead, M. H. (*Johns Hopkins Univ., Lab. of Climat., Seabrook, N. J.*), **The relations between wind structure and turbulence near the ground.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 19:97-129, Dec. 1952. figs., tables, refs., eqs. **DWB**—It is assumed that not only the exchange coefficient varies linearly with height but also the shearing stress, a statement which was criticized in the subsequent discussion. The final integral for the velocity contains 4 constants so that it can easily describe various observed wind profiles, making the author believe that experimental evidence of the boundary layer assumption is provided. Furthermore, a linear variation of heat and moisture flux with height (!) is assumed. The solutions do not contain the roughness parameter and the universal turbulence constant usually found in other formulas. An extrapolation of HALSTEAD's formula to greater heights roughly agrees with HELLMANN's observations giving a minimum wind velocity during noon. *Subject Headings:* 1. Wind profiles 2. Turbulence in the friction layer 3. Austausch theory.—*A.A.*

5.8-164

551.551:620

Pellisari, L., **Le "raffiche in aria limpida."** [Clear air gusts.] *Rivista di Meteorologia e Aeronautica*, 13(1):53-54, Jan./March 1953. **MH-BH**—Review of work of HISLOP at Farnborough in connection with comet flights and turbulence encountered at levels >6000 ft. Mention is also made of work of ROWE and of C. P. MOOK in U.S.A. *Subject Headings:* 1. Clear air turbulence 2. Gustiness 3. Farnborough, England.—*M.R.*

5.8-165

551.551:531

Rashis, Bernard, **Analytical investigation of the effect of the rate of increase of turbulent kinetic energy in the stream direction of the development of turbulent boundary layers under adverse pressure gradients.** *U. S. NACA, Technical Note*, 3048, Nov. 1953. 30 p. 8 figs., 2 tables, 14 refs., eqs. **DWB**—A general integral form of the boundary-layer equation which includes the Reynolds normal-stress term was derived. From this general form, two special equations—namely, the modified momentum equation and the modified kinetic-energy equation—are obtained. These modified equations include the effect of the Reynolds normal stress in the stream direction. The parameters for the dissipation of the mean-flow kinetic energy by the shearing stress are suggested by the use of the Fediaevsky analysis for the shear stress across turbulent boundary layers and by the use of a friction formula that makes the surface shear depend on the shape of the velocity profile, as well as on the Reynolds number. The parameters obtained in this way are found to be the same as those previously assumed by other investigators. The parameters for the Reynolds normal stress are suggested by assuming that a relation between the local fluctuating axial velocity and the local mean velocity and mean velocity that is useful in wind tunnels can be used to determine some of the parameters upon which the Reynolds normal stress may depend. A test of these parameters by a limited amount of data shows no better correlation than previously obtained in this analysis. A lack of correlation may be caused by incorrect parameters or insufficient data. *Subject Headings:* 1. Boundary layer theory.—*Author's abstract.*

WIND VARIATIONS

See also: Lightship "S2" in North Sea hurricane (Meinke, others), 5.8-35; Cloud due to monsoon (Hata), 5.8-199.

5.8-166

551.553.11(495)

*Karapiperis, Photios P. (*Nat. Obser. of Athens and Univ. of Athens, Greece*), **Characteristics of local winds at Athens, Greece.** *Geofisica Pura e Applicata*, 25:203-206, 1953. figs., tables, 4 refs. **MH-BH**—Data on the diurnal wind speed at Athens in July for sea breeze days, all days and Etesian days, frequency of days with sea breeze in Athens for decadal periods 1901-1940, and frequency of different numbers of sunshine days for consecutive days with sea breeze for each month for 1901-1940 are given. By means of LAMBERT's formula the author calculated the true azimuth of the wind on sea breeze days, the magnitude of the resultant of the total wind on sea breeze days alone and climatological resultant velocity for hours on sea breeze days and similar characteristics for Etesians in July. *Subject Headings: 1. Sea breezes 2. Etesian winds 3. Athens, Greece.—I.L.D.*

5.8-167

551.553.21:551.543:551.590.21

Dmitriev, A. A., **O svyazi musonnykh kolebaniy davleniya i temperatury s solnechnoy aktivnost'yu.** [Monsoonal oscillations of pressure and temperature and their connection with solar activity.] *Meteorologiya i Gidrologiya*, No. 5:52-59, 1949. 5 refs., 18 eqs. **DLC**—The seasonal variations of the temperature, pressure, and wind fields are computed on the basis of hydrodynamic equations assuming a temperature discontinuity with seasonal oscillations along the shore between an ocean and continent with different thermal conductivity. The author assumes that the changes in the solar activity influence eventually the intensity of vertical mixing (thunderstorms) and increase precipitation. The theoretical results agree quite well with deviations of pressure and temperature for varying solar activity, derived for the whole world by EIGENSON (see item 5-105 May 1950, *MAB*). *Subject Headings: 1. Monsoonal oscillations 2. Monsoon theory 3. Solar influences.—A.A.*

WIND

See also: Occurrence of critical flow and hydraulic jumps in multi-layered fluid system (Benton), 5.8-1; New wind calculator for use on board (Petri), 5.8-28; Cold pools and their role in development of northwesterners . . . (Ramaswamy, Bose), 5.8-114.

5.8-168

551.554:551.524.4:551.511

Frankenberger, Ernst, **Sommerliche Mittagsprofile der potentiellen Temperatur, der spezifischen Feuchte, der thermischen Energie und der Windstärke an klaren Tagen über dem Schleswig-Holsteiner Wiesengelände bei verschiedenen Windstärken.** [Summer day profiles of potential temperature, specific humidity, thermal energy and wind force on clear days over a Schleswig-Holstein meadow at different wind forces.] *Annalen der Meteorologie*, 6(1/2):1-4, 1953/4. 4 figs., 2 tables. German and English summaries p. 1. **MH-BH**—Observations were taken at four heights, 2 to 70 m, at Quickborn at 12-14 h and curves of vertical variation of differences from 2 m of potential temperature, vapor pressure, equivalent potential temperature and wind speed are interpolated for winds of 1, 3, 5, 7 and 9 m/s at 20 m. From these the vertical exchange coefficients are calculated at 10 and 30 m. The vertical exchange coefficient of heat conforms with potential temperature. The coefficients of heat and water vapor are equal and are affected by an internal boundary layer. *Subject Headings: 1. Lapse rates 2. Heat and moisture transport 3. Wind profiles 3. Hamburg, Germany.—C.E.P.B.*

5.8-169

551.554 551.557

*Jones, Donald R. (*Bur. of Aeronautics Project AROWA, NAS, Norfolk, Va.*), **Note on observed vertical wind shear at low levels over the ocean.** *American Meteorological Society, Bulletin*, 34(9):393-396, Nov. 1953. 2 figs., 2 tables, 5 refs. **MH-BH**—The wind does not always increase with height above the sea, as is commonly thought to be the case; but in a variable percentage of the cases calculated by Project AROWA, during the 8 week period Nov.

1951-Jan. 1952, at the Weather Ship Stations over the North Atlantic, it was found that the speed of the wind decreased with height from the surface to 1000 or 2000 ft. If the lapse rate is steep, the percentage of anomalous cases is substantial (>50%), whereas under stable conditions the percentage is low (3% to 25%). Some of these cases may be due to observational errors. *Subject Headings:* 1. Wind profile above sea 2. Instability effects 3. North Atlantic.—M.R.

5.8-170

551.555:551.55

Čadež, M., *Über einige Einflüsse orographischer Hindernisse auf die Luftbewegung* [On the influence of orographic obstacles on air motion.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(3/4):403-416, 1954. 5 figs., 15 refs., 11 eqs. German, English and French summaries p. 403. **DLC**—Pools of cold air under moving warm air have a sloping surface, highest where pressure is lowest, so that low pressure sucks in cold air. The circulation in such a case is discussed, weather depending on if warm air is stable or labile. During the day the cold pool weakens and may be blown away; in the Pannonian plain this causes daily storms in summer. Conditions in Yugoslavia between Belgrade and Negotin on Nov. 11, 1951, are analyzed, showing development of S.E. wind, the "Koschava" at Belgrade, followed by cold (bora), then warm (föhn). Mechanics of föhn and bora are discussed. Finally, processes associated with air currents over orographic obstacles are examined mathematically. *Subject Headings:* 1. Koschava wind 2. Föhn theory 3. Bora theory 4. Topographic effects.—C.E.P.B.

5.8-171

551.55

Karapiperis, Leon N., *Über eine Klassifizierung der Etesien auf Grund der herrschenden isobarischen Zustände*. [On a classification of the Etesian winds on the basis of the prevailing isobaric situation.] *Meteorologische Rundschau*, 7(1/2):6-9, Jan./Feb. 1954. 7 figs., tabular 17 refs. **DWB**—Days (1750) of Etesian winds in the E. Mediterranean, July-Sept. 1901-1951 are classified into 6 types. The classic type A₁ (30%) shows a low in S.W. Asia and high over Azores. A₂ (10%) has a secondary low over Cyprus. B₁ (20%) has a secondary high over Europe, B₂ (9%) also a secondary low over Arabia. C (19%) has anticyclones over Azores and Russia, D (13%) an anticyclone over N. Europe. Runs of 10-19 Etesian days in Aegean are tabulated. *Subject Heading:* 1. Etesian winds.—C.E.P.B.

WIND EFFECTS

See also: Stratification and overturn in lakes and reservoirs (Thompson), 5.8-156.

5.8-172

551.556:532.593:551.55

Kitkin, P. A., *Vozdeistvie vetra na tolshchu vody v melkom zamknutom basseine*. [Influence of the wind on the depth of water in a shallow closed basin.] *Akademiia Nauk SSSR Doklady*, 91(6):1325-1328, Aug. 21, 1953. 2 refs., 20 eqs. **DLC**—A theoretical analysis of the development of water movement under wind influence within a closed basin, the depth of which varies from a maximum in the center to zero at the edges; turbulent exchange in horizontal and vertical directions and the effect of the earth's rotation are considered. *Subject Headings:* 1. Wind waves 2. Shallow water waves 3. Wind effects on water depth.—I.L.

5.8-173

551.556:532.593

Lock, R. C., *Hydrodynamic stability of the flow in the laminar boundary layer between parallel streams*. *Cambridge Philosophical Society, Proceedings*, 50(1):105-124, 1954. 3 figures, 5 tables, 7 refs., 49 eqs. **DWB**—Stability of small sinusoidal oscillations in steady laminar flow of air (1-3 m/s) over water at rest is analyzed. The resulting equation has two solutions which represent distinct types of wave motion. In one the dominant effect is gravity, causing waves to move at about the velocity of a water wave of same length in a perfect fluid. In the other, the amplitude of oscillation in the air is much greater than in the water; the oscillation is unstable and the laminar flow breaks down in turbulence instead of developing water waves. Curves showing conditions for neutral stability are given. *Subject Heading:* 1. Wind waves.—C.E.P.B.

5.8-174 551.556:551.31(261.3)
 *Reinhard, Heinrich, **Der Bock. Entwicklung einer Sandbank zur neuen Ostsee-Insel.** [The Bock. Development of a sandbank into a new Baltic island.] *Petermanns Geographische Mitteilungen, Ergänzungsheft*, No. 251, 1953. 128 p. 29 figs., 10 plates, 30 photos, 10 tables, 191 refs. **DLC**—The Bock is a sandbank on the Baltic coast of Germany, about 55°N, 13°E, carrying some islands, protected by dunes and partly wooded. This study describes the effect of wind and sea on the piling up of material. Water levels at Barhöft are tabulated; the extreme range is 402 cm. Frequencies of wind force and direction 1931-37 are tabulated and the storms of March 1, 1949 and Oct. 10, 1926 and their effects described. Duration of sea ice in each winter is given. *Subject Headings*: 1. Wind effects 2. Sand dunes 3. Baltic Sea Coast, Germany.—*C.E.P.B.*

5.8-175 551.556:532.593
 Révillon, Vaisseau, **Houle, état de la mer, courants dus au vent.** [Waves, state of sea, wind currents.] *La Météorologie*, Paris, 4th Ser., No. 30:103-135, April/June 1953. 33 figs. French, English and Italian summaries p. 103. **MH-BH**—An extensive treatment of the major aspects of scientific forecasting of waves and currents at sea and along coasts. The terms in use are first defined and the theory of waves developed. Then the actual complexity of the waves created by wind at sea, as compared with theory is discussed. Principles of forecasting waves and state of sea, and practical methods, aids, etc. are described and illustrated. The British Admiralty Tables and the Bates nomograms for predicting wave height from wind speed and fetch (40, 100, 200, 300, 550 and 750 mi) for 6, 12, 18, 24, and 36 hours are tabulated and distance of travel of 0-2000 miles, giving wave heights of 2' to 30' are presented and discussed in connection with rapid prediction methods. *Subject Headings*: 1. Wave forecasting techniques 2. Ocean currents 3. Wind waves.—*M.R.*

5.8-176 551.556.3:621.311.24
 Ein neuratiges Windkraftwerk. [A new wind power generator.] *Umschau*, 54(10):303, July 15, 1954. 2 figs. **DGC**—Description of a new installation at St. Alban's, England, in which air is expelled from hollow vanes by centrifugal force and sucked in below past a turbine which drives a generator. *Subject Heading*: 1. Wind generators.—*C.E.P.B.*

UPPER AIR WINDS

See also: Recent advance in study of ionospheric winds (Manning), 5.8-25; Criteria for movement and development of waves in westerlies (Gleeson), 5.8-68; Contour chart accuracy in forecasting upper winds (Murray), 5.8-69; Zero layer effect and frontal zones (Faust), 5.8-89; Jet stream structure (U. S. Bur. of Aeronautics), 5.8-111; Temp. and winds in ozone layer during Oldebroek explosion (Regula), 5.8-148; Vertical wind shear over ocean (Jones), 5.8-167; Artificial atomic radioactive aerosols as markers in met. current investigations (Herbst, others), 5.8-276.

5.8-177 551.557:551.510.535
 †Becker, Walter, **Winde und turbulente Luftströmungen in der Ionosphäre.** [Winds and turbulent air currents in the ionosphere.] *Archiv für Meteorologie, Geophysik und Biometeorologie*, Ser. A, 6(3/4):417-439, 1954. 6 figs., 5 tables, 51 refs. English and French summaries p. 417-418. **DLC**—Methods of observation are classified as non-electric (rockets, cosmic dust, aurora, luminous clouds, meteor trails), and radio-wave techniques (1 to over 100 m). The range of velocities is 50-400 m/s (one observation of 1100); maximum frequency 100 m/s at 80-120 km and 100 m/s in F layer, but standard deviation is several hundred per cent. Determinations of turbulence are discussed; their period is inversely proportional to observation radio frequency. In the F-layer the propagation of deviation centers is proportional to the geomagnetic character figure. In the E-layer solar and lunar tides give a velocity range of 35 and 25 m/s. *Subject Headings*: 1. Ionospheric winds 2. Ionospheric turbulence.—*C.E.P.B.*

5.8-178

551.557

*Darling, Eugene M., Jr. (*GRD, AF Cambridge Research Cir., Mass.*). **Winds at 100 mb and 50 mb over the United States in 1952.** *American Meteorological Society, Bulletin*, 34: 458-461, Dec. 1953. 2 tables, 11 refs. **MH-BH**—Radiosonde-wind data at 100 mb and 50 mb over the U. S. in 1952 are presented in the form of month-by-month frequency distribution of westerly and easterly winds. These data show that the 50 mb circulation in the month of February differed markedly from the expected pattern. *Subject Headings: 1. Upper air frequencies 2. United States.—Author's abstract.*

5.8-179

551.557

Green, C. G. and Kerr, I. S. **Report on Central North Island upper wind investigation September to November 1949.** *New Zealand. Meteorological Office, Circular Note*, No. 11, Nov. 20, 1950. 7 p. tables. **DWB**—Pilot balloons and radar were employed at New Plymouth and Ohakea in order to investigate reports of the departure of observed winds from the North Island region from those forecast. The observations from the various stations have been examined for vector differences and differences in direction and speed both in individual cases and in means and are summarized in a table. It is concluded that during the period studied no evidence of any abnormally strong winds in the Taumerunui or Reethi areas was found, but that the high country in the interior of the island often reduces the strength of the wind even at 7000 ft. *Subject Headings: 1. Upper air wind variability 2. Upper air soundings 3. North Island, New Zealand.—I.L.D.*

5.8-180

551.557.3:551.515.13

551.557

Seshimo, Y. **On the zonal wind in the winter, Nov. 1951-April 1952.** *Journal of Meteorological Research*, Tokyo, 5(3):165-172, March 1953. 12 figs., table. 5 refs. In Japanese. English summary p. 165. **MH-BH**—For the purpose of forecasting the winter weather in Japan the variation of zonal wind speed at the 700 mb level was investigated. The winter mass outbreak which brings about cold weather in Japan is classified as follows: (I) Major type; (A) Major trough type, (B) Confluence type, (II) North high type. This latter type is analyzed in detail by means of contour charts and cross sections. *Subject Headings: 1. Upper air circulation 2. Forecasting techniques.—Author's abstract.*

5.8-181

551.557.3

*Hofmeyr, W. L. **A statistical analysis of radar winds over Pretoria in summer, 1952.** *Africa. Weather Bureau, News*, 2(3):144-148, 1953. 5 tables, 5 refs. **DWB**—Extensive statistical tables presented here show frequencies of upper wind speeds according to 16 ranges for 850, 700, 500, 300, 200, 150, 100, 80 and 60 mb levels. Also resultants and components for same levels, standard deviations in knots of W-E and S-N components and of corresponding wind vectors, and frequency distribution of W-E and S-N components at 500 and 300 mb (20 knot class intervals) and autocorrelation coefficients for lags of 1 and 3 days and simultaneous correlations between components at different levels. Analysis shows that in summer westerlies are weaker at most levels over Pretoria than in winter, and an easterly wind exists at high altitudes. Maximum wind speed occurs at 200 mb. Data used were for 6 months, Oct. 1952 to March 1953 (see 4F-124, June 1953, *MAB* for comparative data). *Subject Headings: 1. Upper air wind analysis 2. Upper air wind frequencies 3. Pretoria, South Africa.—M.R.*

AQUEOUS VAPOR AND HYDROMETEORS

HUMIDITY

See: Calculation of water vapor pressure between 0 and 100°C (Duclaux), 5.8-27

EVAPORATION

5.8-182

551.573

Frankenberger, Ernst. **Messungen der natürlichen Verdunstung über Gras nach verschiedenen Methoden und einige Folgerungen betreffend atmosphärische Turbulenz und Konvektion.** [Measurements of natural evaporation over grass by different methods and some conclusions regarding atmospheric turbulence and convection.]

ome consequences concerning atmospheric turbulence and convection.] *Annalen der Meteorologie*, 6(1/2):5-13, 1953/4. 8 figs., 3 tables, 12 refs., 10 eqs. German and English summaries p. 5. **MH-BH**—Measurements of evaporation at Quickborn with the small Popoff lysimeter and with a special fine-scale apparatus are compared with values calculated by heat economy and austausch methods. The nature of convection is examined; the observed temperature gradients in the lowest 20 m are so far below those required for Benard cells that these cannot be accepted. Fine-scale records of vertical velocity at 10 m agree fairly well with those given by HESSELBERG's formula and by calculation from heat transfer, but show little relation to prevailing wind speed. *Subject Headings*: 1. Evaporation measurements 2. Wind structure 3. Hamburg, Germany.—*C.E.P.B.*

5.8-183

551.573

Lull, Howard W. (comp.), **Evapo-transpiration**. Excerpts from selected references. U. S. Forest Service. Southern Forest Experiment Station, Occasional Paper, No. 131, Aug. 1953. 117 p. **DWB**—Excerpts from 76 papers covering general aspects and separately evaporation, transpiration, evapotranspiration, roots and their relation to soil moisture. The compilation mainly intends to present the different views, published in English, on the problems in these fields, gives also some data but practically no formulas. *Subject Headings*: 1. Evapotranspiration 2. Soil moisture 3. Literature reviews.—*A.A.*

5.8-184

551.573:551.511

Möller, Fritz (Met. Inst., Univ. Mainz), **The determination of evaporation from large areas by the horizontal advection in the free atmosphere**. I.U.G.G. International Association of Scientific Hydrology, Brussels, 1951, [Transactions], 3:482-483, 1952. 2 tables. **DWB**—The atmosphere was divided in layers of different pressure and for each layer the individual change of moisture content was computed for every day, considering horizontal advection and neglecting the vertical term. Using triangles of radiosonde stations, the evapotranspiration (E) during each season (one year) was determined for three areas. The annual totals are very high: $E=598$ mm for the triangle England-North Sea-Germany (Precipitation $P=674$ mm); NE Atlantic $E=1080$, $P=825$; NW Germany $E=828$, $P=872$ mm. *Subject Headings*: 1. Evapotranspiration 2. Advection 3. North Atlantic 4. Europe.—*A.A.*

5.8-185

551.573:551.481

*Neumann, J., **Energy balance and evaporation from sweet water lakes in the Jordan rift**. Israel. Meteorological Service, Series A, Meteorological Notes, No. 10, 1954. 21 p. 4 figs., 3 tables, 27 refs., 20 eqs. Reprint from: *Bulletin of the Research Council of Israel*, 2:337-357, 1953. **GB-MO**—Evaporation was calculated monthly for Lakes Hula and Tiberias on the Jordan, from energy interchange between lakes and atmosphere, using air temperature, vapor pressure, cloud amount, and lake temperatures at various depths. For Lake Tiberias, average depth 24 m, area 167 km², annual evaporation is 162 cm, maxima Oct. (24 cm) and March (8.5), minima May (5) and Jan. (6.5). For L. Hula (depth 1.7 m, 14 km²) evaporation is 68 cm, with single maximum (28.5) in July and minimum (2.5) in Dec. *Subject Headings*: 1. Evaporation 2. Lake Tiberias, Israel 3. Lake Hula, Israel.—*C.E.P.B.*

5.8-186

551.573

Neumann, J., **A note on the estimation of diurnal amounts of evaporation**. Royal Meteorological Society, Quarterly Journal, 80(344):236-237, April 1954. table, 3 refs., 4 eqs. **MH-BH**—The Thornthwaite-Holzman expression for daily mean evaporation, using PASQUILL's data, becomes

$$E = 4.96 \times 10^{-8} u_{50} (e_{25} - e_{50}).$$

E in g/cm²/sec, u wind in cm/sec and e vapor pressure mm at 25 and 50 cm height, values are compared calculated from daily mean data, hourly means and daily mean daylight data. *Subject Heading*: 1. Evaporation estimation.—*C.E.P.B.*

5.8-187

551.573

Neumann, J. (Israel Met. Ser., Hakirya, Tel Aviv, Israel), **On a relationship between evaporation and evapotranspiration**. American Meteorological Society, Bulletin, 34(10):454-

457, Dec. 1953. 2 tables, refs., 14 eqs. **MH-BH**—Heat balance considerations indicate that the annual amount of evaporation from an extensive water surface is greater by some 33 percent than evapotranspiration from an extensive vegetation-covered land surface having an ample supply of water. The assumption is that the same amount of insolation reaches both surfaces. Turbulence theory is used to show that the above estimate leads to values for the friction velocity (or shearing stress) which are in close agreement with independent results for vegetation-covered land surfaces, indicating the correctness or approximate correctness of the above estimate. The assumption of the demonstration is that the geostrophic wind is the same over both surfaces. It is estimated that the annual amount of sensible heat transfer from the vegetation-covered land surface is some 5 to 10 percent of the insolation reaching that surface. *Subject Headings:* 1. Evaporation 2. Evapotranspiration 3. Turbulence theory.—*Author's abstract.*

5.8-188

551.573:551.1

Neumann, J., **On the annual variation of evaporation from lakes in the middle latitudes.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 5(3/4):297-306, 1954. 1 table, 20 refs., 5 eqs. English, German and French summaries p. 297-298. **DLC-H**—Heat balance of lakes is represented by: heat lost to atmosphere by evaporation and conduction = radiation surplus at lake surface minus change of heat storage in lake. These four terms are evaluated monthly from available data. Results show that annual variation of evaporation from non-shallow lakes tends to be a double wave resembling that in oceans in similar latitudes but earlier in phase by an amount depending on shallowness of lake. Minima occur in winter and in spring or early summer. *Subject Heading:* 1. Evaporation from lakes.—*C.E.P.B.*

5.8-189

551.1

Rider, N. E., **Evaporation from an oat field.** *Royal Meteorological Society, Quarterly Journal*, 80(344):198-211, April 1954. 6 figs., 2 tables, 17 refs., 6 eqs. **MH-BH**—The aerodynamic method of estimating evaporation from wind speed u and specific humidity at different height z was modified to the equation

$$E = \frac{\rho k^2 (1-\beta)^2 (q_1 - q_2) (u_2 - u_1) Z_0^{2(1-\beta)}}{[(z_2 - d)^{1-\beta} - (z_1 - d)^{1-\beta}]^2}$$

This was applied to observations in an oatfield; set up shown. A graph for determining sun zero displacement d and hence β at different wind speeds at 2 m is given. Calculated hourly and daily rates of evaporation are shown, but general application of (4) was impossible on account of uncertainty in wind speeds and value of d ; in general, computed water losses are up to 50 percent too low. *Subject Heading:* 1. Evapotranspiration.—*C.E.P.B.*

CLOUD PHYSICS AND CONDENSATION NUCLEI

See also: Charge generation in thunderstorm theory (Mason), 5.8-7; Spatial integrating optical method of measuring vertical temp. and water vapor gradient in lowest atmos. (Brocks), 5.8-147.

5.8-190

551.574.1:551.577.11:551.1

†East, T. W. R. and Marshall, J. S., **Turbulence in clouds as a factor in precipitation.** *Royal Meteorological Society, Quarterly Journal*, 80(343):26-47, Jan. 1954. 10 figs., 3 tables, 34 refs., 36 eqs. Also in: McGill University. Macdonald Physics Laboratory. Storm Weather Research Group, Contract AF 19(122)-217, Scientific Report, NW-15, July 1954. 44 p. 10 figs., 3 tables, refs., 36 eqs. **DWB**—Origin and rapid development over a height range of raindrops in a Cu cloud often below 0°C level cannot be due to settling under gravity, as LANGMUIR (1948) showed this to be too slow for droplets of radius <20 microns. The effect of coalescence due to turbulence associated with updraft is discussed, and it is shown that collisions due to local turbulence of sufficient violence (equivalent to double gravity field) may initiate growth of droplets in a young Cu, causing change to heavy Cu and initiating a shower. Above 20 microns growth would continue without turbulence. Further data are required. *Subject Headings:* 1. Rain from non-freezing clouds 2. Turbulence

nation. I. McGill Univ. Macdonald Physics Lab. II. Contract AF 19(122)-217.—*P.B.*

5.8-191 551.574.1
Frisch, H. L. and Collins, Frank Charles (*Polytech. Inst., Brooklyn*), **Theoretical investigation of the growth of aerosol particles by diffusion**. Polytechnic Institute of Brooklyn. Contract No. AF 19(122)-412, Rep. No. 3 Aug. 1-Oct. 31, 1951. 18 p. 2 refs., 62 eqs. *B*—In previous reports the solutions for moving sink (droplet) boundary diffusion problem are given for special case when product of initial concentration and specific growth constant of the boundary is < 1 . In this report the approximate solution is given in one dimension for the case when that product is > 1 . The presence of a multiplicity of sinks in the diffusion field when it leads to final collapse of the aerosol supersaturation is also dealt with by a simple equation presented for calculation of this effect. *Subject Headings: 1. Droplet deposition 2. Diffusion processes 3. Cloud physics. I. Polytechnic Institute of Brooklyn Contract AF 19(122)-412.—From authors' abstract.*

5.8-192 551.574.1
Levin, L. M., **O nosazhdenii chastits iz potoka aerezolia na prepiatstviiia**. [Deposition of particles from aerosol onto an obstacle.] *Akademiia Nauk SSSR, Doklady*, 91(6):1329-1332, Aug. 21, 1953. table, 4 refs., 16 eqs. *DLC*—In order to determine the relationship between the number of drops of given size deposited upon an obstacle and the number of drops in unit volume of a cloud it is necessary to introduce the concept of coefficient of capture. It is demonstrated theoretically that the minimum diameter of the droplets captured by an obstacle is determined by the gradient of air velocity near the anterior critical point of a cloud on an obstacle. The relationship of this critical point to the capture coefficient and its value for various types of aerosols are given in a table. *Subject Headings: 1. Aerosol deposition 2. Drop size distribution.—I.L.D.*

5.8-193 551.574.1
Qvist, Walter, **Om aerosoler, deras allmänna egenskaper samt tekniska och militära betydelse**. [General properties of aerosols; their technical and military significance.] *Tekniska Föreningens i Finland, Förhandlingar*, 62(10):189-195, 222-227, Oct. 1942. 10 figs., 10 refs. *DLC*—Aerosols are subject to sedimentation, aggregation and coagulation and are characterized by electrical and optical properties. The meteorological aspects are discussed including condensation, fog, precipitation, electrical discharge, pollution, etc. The military and technical application of aerosols are discussed in general, including defensive and offensive measures and counter measures. *Subject Headings: 1. Aerosols 2. Condensation nuclei.—W.*

5.8-194 551.574.1
Rau, Walter, **Gefrierkerngehalt und Gefrierkernspektrum des natürlichen Aerosols**. [Freezing nuclei content and freezing nuclei spectrum of natural aerosol.] *Meteorologische Zeitschau*, 7(3/4):59-64, March/April 1954. 8 figs., table, 19 refs. *DWB*—Numbers of freezing nuclei in outside air, exhaled air and room air were measured in a cloud chamber as a function of temperature effective at -10°C and 0.5 at -20°C . There was little increase between -14 and -18°C , a rapid rise below -28° . Room air showed a secondary maximum about -20°C . Measurements by other investigators are compared. Temperature frequency spectra of freezing nuclei formed by drops of different sizes in artificial fog and natural aerosol are compared. *Subject Heading: 1. Freezing nuclei.—C.E.P.B.*

5.8-195 551.574.1
Rouilleau, Jean (*Etabl. d'Études et de Recherches Met.*), **Conceptions actuelles du mécanisme de la pluie**. [Contemporary concepts on the mechanics of rainfall.] *L'Astronomie*, Paris, 57:213-222, June 1953. 6 figs. *DWB*—This semi-popular treatment gives cross section of upsiding and convective motion cases and discusses BERGERON's theory of the origin of precipitation, the application of radar and the artificial stimulation of rainfall. *Subject Headings: 1. Origin of rain 2. Bergeron's theory.—A.A.*

FOG

5.8-196

551.575

Jacobs, L., **Coastal fog patches.** *Meteorological Magazine*, London, 83(983):145-150, May 1954. 7 refs. DWB—Discusses synoptic situations causing sea fog on several occasions on the coast of Wales, especially near Aberystwyth, described in papers quoted. *Subject Headings: 1. Coastal fog 2. Wales.—C.E.P.B.*

5.8-197

551

Kerr, I. S., **The duration of fogs at Whenuapai.** *New Zealand. Meteorological Circular Note*, N. 60, Aug. 15, 1950. 4 p. tables. DWB—An examination of 55 fog (of which 4 were discarded) showed that the mean duration of fog after sunrise (1) was 1 hour with a range of $\frac{1}{2}$ to 7 hours, (2) was independent of relative humidity at midnight and lapse of relative humidity, (3) that the rule that the later the fog forms the later it dissipates or vice versa holds perhaps only for clear skies but is not necessarily true when a cloud is present during part or all of the night and (4) that an easterly or northeasterly drift developed before the fog has completely cleared may bring it back only when the fog has persisted for periods of at least two hours under the influence of light gradient winds from an easterly direction. Rules for forecasting fog clearance time and results of their trial are given. *Subject Headings: 1. Fog duration 2. Fog dissipation 3. Whenuapai, New Zealand.—I.L.D.*

5.8-198

551.575.1:551.575.2

Stewart, K. H., **Model to illustrate the formation of smoke fog.** *Meteorological Magazine*, London, 83(982):114-115, April 1954. 2 photos. MH-BH—Model is a small wind tunnel with two heating panels at intake end to give either lapse or inversion conditions. Smoke is passed in through chimneys. Temperatures are shown by thermometers near top and bottom. The photos show a realistic demonstration of difference between lapse and inversion conditions. *Subject Heading: 1. Smog.—C.E.P.B.*

CLOUDS

See also: Radar echoes from turbulence in clouds (Jones), 5.8-34; *Dust cloud in stratosphere* (Jacobs), 5.8-88; *Synoptic study for Ikateq, Greenland* (Sanders), 5.8-262.

5.8-199

551.576:551.577

Hata, S., **On the cloud due to monsoon at Niigata.** *Journal of Meteorological Research*, Tokyo, 5(2):89-94, March 1953. fig., 4 tables. In Japanese; English summary. MH-BH—Analyzing data for cloud heights observed at Niigata the author reaches the following conclusions: 1) The tops of cumulonimbus are lower in winter than in the summer season. 2) Cumulonimbus due to monsoon grows under the transitional layer. 3) Cumulonimbus in winter can be classified into five types. In addition to these, irregular types can be sometimes observed. *Subject Headings: 1. Cumulonimbus clouds 2. Monsoon clouds 3. Niigata, Japan.—Author's abstract.*

5.8-200

551.576.1 551.576.2

Feteris, P. J., **Cloud-streets and a funnel-cloud over Terschelling Island.** *Weather*, 9(2):42-44, Feb. 1954. 2 figs., 3 photos, ref. MH-BH—Notes on cloud formations July 4, Aug. 4, 1953. Cloud streets formed over or near the island when the wind blew nearly parallel to its length. A waterspout passed directly overhead on Aug. 2. *Subject Headings: 1. Cloud forms 2. Waterspouts 3. Holland.—C.E.P.B.*

5.8-201

551

Murgatroyd, R. J. and Goldsmith, P., **Cirrus cloud over southern England.** *Great Britain. Meteorological Research Committee, M.R.P.* 833, Sept. 30, 1953. 13 p. 12 figs., 4 tables, 9 refs. Mimeo. GB-MO—Frequencies of Ci observed at 3 ground stations are tabulated and reality of peculiarities such as peaks at dawn and dusk in summer and night minima are discussed. Frequency of various types of Ci is tabulated. Aircraft observations are summarized; in only 27% are large areas found clear of Ci. Base mostly 25-30,000 ft.

perature -40 to -50°F (-40°F is limit of spontaneous nucleation). Tops near tropopause at -40 to -75°F . A "moist layer" is generally found at 28-32,000 ft. Pt. 3 gives bases on forecasting high cloud and condensation trails. *Subject Headings:* 1. Cirrus clouds England.—C.E.P.B.

PRECIPITATION

See also: Precip. persistence and weather lore (Bähr), 5.8-79; Moon phases and summer-fall precip., Hungary (Berkes), 5.8-80; Role of atmos. precip. in transfer of dissolved substances (Maksimovich), 5.8-86; Turbulence in clouds, factor in precip. (East, Marshall), 5.8-190; Lochaber, Appin and Benderloch floods (Common), 5.8-221; Radioactivity of precip. (Santomauro, Cigna), 5.8-277.

5.8-202 551.577:551.506(548)
*Ramakrishnan, K. P. and Narayanan, J. (*Met. Off., Poona*), A study of fifty years' rainfall Nagapattinam. *Indian Journal of Meteorology and Geophysics*, 4(4):310-338, Oct. 1953. figs., 16 tables, ref. MH-BH—Nagapattinam ($10^{\circ}46'\text{N}$, $79^{\circ}53'\text{E}$) is on low ground near sea on east coast of Madras. This statistical compilation, based on records for 1901-50, tabulated daily, 3-day and 15-day means of rainfall, monthly means and extremes, raindays, intensities of daily falls, frequencies of dry periods and spells of heavy rain and seasonal totals. Extensive tables list all individual totals from 4 inches in a day up to 16 inches in 7 days, with synoptic notes on the heavier falls. *Subject Headings:* 1. Rainfall data analysis 2. Madras, India.—C.E.P.B.

5.8-203 551.577:551.501.6
Seltzer, P., Un essai: la carte des pluies annuelles probables en Algérie. [Tentative chart of annual probable rainfall in Algeria.] *La Météorologie*, Paris, 4th Ser., No. 29:73-75, March 1953. figs., 3 refs. French, English and Spanish summaries p. 73. MH-BH—Chart shows isohyets of average annual rainfall and annual variability by means of a scheme cross-hatching. Data from 108 stations for 40 years 1900-1940, were used when available. The scale of the chart does not allow much differentiation between variability within the same isohyetal intervals, but that is not, as a rule, necessary since the variability intervals usually embrace 2 or more isohyetal intervals, are homogeneous within a class interval. *Subject Headings:* 1. Isohyetal charts 2. Precipitation variability 3. Algeria.—M.R.

5.8-204 551.577(44)
*Striffing, Maurice, Contribution à l'étude des précipitations atmosphériques dans la région Lyonnaise. [Contribution to the study of atmospheric precipitation in the Lyons region.] *Lyons. Université. Institut des Études Rhodaniennes, Mémoires et Documents*, 7, 1953. 36 p. 10 figs., 5 tables, 8 refs. DLC—Rainfall intensity, duration and frequency at Lyon, based on records for 1946-1951, is compared with that at other important places in France, and the most intensive cases studied synoptically and statistically according to air flow regimes and isohyetal charts drawn for the entire region for the flood producing rains of 1950 and 1951. Methods of "dynamic climatology" including analysis of radiosonde and upper wind observations are employed throughout. The S-SW type accounts for 76% of the days with >10 mm rain and 80% of the amount fallen, and for most of the thunderstorms at the time of the rain (before or during a frontal passage) the surface wind may be W. *Subject Headings:* 1. Rainfall frequencies 2. Rain intensities 3. Synoptic climatology 4. Thunderstorm rainfall 5. Lyons Region, France.—M.R.

5.8-205 551.577.1:551.501.81
Dennis, A. S., Initiation of showers by snow. *Journal of Meteorology*, 11(2):157-162, April 1954. 6 figs., 9 refs. Also in: McGill Univ. Macdonald Physics Laboratory. Stormy Weather Research Group, Contract AF 19(122)-217, Scientific Report MW-14, June 1953. MH-BH, DWB—Vertical radar photos at Montreal are given showing shower echoes associated with snow trails. Trail of snow can seed other clouds at a lower level by being entrained on wind side. If tops of largest cumuli are at -3 to -12°C , this could initiate showers which otherwise would not occur. This theory is supported by observed radar patterns and by a

three-dimensional analysis, leading to discontinuous patches of continuous precipitation. Synthesized plans show showers to be more frequent in regions of snow trails than elsewhere. *Subject Headings: 1. Precipitation formation 2. Radar analysis of precipitation. I. Macdonald Univ. Macdonald Physics Lab. Stormy Weather Research Group II. Contract AF 19(12) 217.—C.E.P.B.*

5.8-206

551.577.2 (689):551.577.3

*Sellick, N. P., *Intensity-duration curves for rainfall in Rhodesia. Southern Rhodesia Meteorological Dept., Meteorological Notes, Ser. A, No. 2, 1953. 7 p. 2 figs., 3 tables. DWB* On the basis of autographic records for 11 stations, intensity of heavy falls of rain is represented by $a/(t+30)$ where t is time in minutes and $a = 75 \log \frac{f}{33.2} d + 125$; f = mean annual rainfall and d number of years. From this curves are drawn of intensity-duration (0-120 min) likely to be reached once in 1, 5, 20 or 50 years at places with annual rainfalls of 16, 24, 32 and 48 inches. Results agree with observations. *Subject Headings: 1. Rainfall intensity 2. Rainfall data 3. Rhodesia.—C.E.P.B.*

5.8-207

551.577.32:551.577.51 (23)

*Hader, F., *Nordostalpine Seehöhenmittel der Niederschlagsmenge (1851-1950). [Nordost Alpine altitude means of rainfall amount (1851-1950).] Archiv für Meteorologie, Physik und Bioklimatologie, Ser. B, 5(3/4):331-343, 1954. 2 figs., 7 tables, 21 refs. German and English summaries p. 331-332. DLC—Mean monthly and annual rainfall calculated for 50 m stages from 100-2100 m; only the lowest levels show a secondary maximum in May. Frequency with which May was the rainiest month of the year varies from 15% in E. Alps to zero in Finland. May pluviometric coefficient in Alps decreases from 1.14 at 175 m to 1.14 at 2075 m, while June-July coefficients increase from 1.43 to 1.57. Low level May maximum is attributed to local thunder rains. *Subject Headings: 1. Rainfall variations 2. Orographic rainfall 3. Alps.—C.E.P.B.**

5.8-208

551.577.36 (43) 551.577.38

*Ringleb, Franz, *Niederschlags- und Trockenperioden in Westdeutschland (am Beispiel der Stationen Aachen und Münster). [Wet and dry periods in Western Germany (exemplified by Aachen and Münster).] Annalen der Meteorologie, 6(1/2):39-57, 1953/54. 23 tables, 13 refs. German and English summaries p. 39. MH-BH—Author tabulates and discusses for Aachen (47 years) and Münster (36 years) frequency of rainless days in each month, each day, and frequency and duration of continuous and broken rainy periods and drought. Longest dry and rainy periods are listed. Probabilities of dry and rainy periods exceeding 10 days in each month are tabulated. *Subject Headings: 1. Rainfall frequencies 2. Drought frequency 3. West Germany.—C.E.P.B.**

5.8-209

551.577.3

Ludlum, David M., *The end of the prolonged drought. Weatherwise, 6(6):172-173, Dec. 1953. figs. DWB—Until rains came to the Southwest U. S. late in Oct. 1953, drought had been the most prolonged and perhaps the most severe dry spell in recent years in the United States. During Aug., Sept. and the first 3 weeks in Oct. 50% of normal precipitation occurred over half of the U. S. Less than 25% of normal fell in Ohio Valley, Colorado and the Southeast. Ft. Myers, Fla., had 29.89" rain in 12 months. Rains began Oct. 19th in the far southwest and spread eastward the next week and another system (tough) gave rain to the Midwest and East on Oct. 25th and 26th. *Subject Headings: 1. Drought, United States (1953) 2. United States.—M.R.**

5.8-210

551.577.3

Ludlum, David M. (ed.), *The summer droughts. Weatherwise, 6(5):148-150, Oct. 1953. 4 charts. MH-BH—Except in a few regions, temperatures were much above normal and precipitation much below normal over the U. S. in July and Aug. (and in Sept. also). Charts show details of anomalies for temperature and precipitation for July and Aug., respectively. *Subject Headings: 1. Drought, United States (1953) 2. United States.—M.R.**

5.8-211

551.577.38(81):551.590.21

Sampaio Ferraz, J. de, *A atual seca nordestina*. [Present drought in the northeast.] *Revista Brasileira de Geografia*, Rio de Janeiro, 15(1):162-164, Jan./March 1953. DWB—The effect of solar activity on atmospheric phenomena is discussed with particular application to the drought conditions prevailing in northeastern Brazil since 1951. Monthly bulletins of solar activity are received in Brazil from Zurich and weekly reports from the Geophysical Observatory Pilar, Argentina. On the basis of recent development in solar activity the hope for an early end of the drought seems reasonable. *Subject Headings*: 1. Drought 2. Solar influences 3. Brazil.—G.T.

SNOW

See also: Lab. investigation of simulated water drops (Sartor), 5.8-9; Snow research in Finland (Angervo), 5.8-22; Impingement of water droplets on NACA 65A004 airfoil . . . (Brun, others), 5.8-23; Objective weather forecasting, Hiroshima (Nishida), 5.8-71; Long range forecast for snow coverage (Sakai), 5.8-73.

5.8-212

551.578.31:09

Kirigin, B., *Historijski pregled istraživanja oblika snježnih kristala*. [Historical review of investigation of the form of snow crystals.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, (3):94-97, July/Sept. 1953. diagr. DWB—Over 30 authors are named who contributed to the study and classification of snow crystal forms since the 16th century. The nature of their contributions is briefly specified. *Subject Headings*: 1. Snow crystals 2. History of meteorology.—G.T.

5.8-213

551.578.41

Langleben, M. P., *The terminal velocity of snowflakes*. *Royal Meteorological Society, Quarterly Journal*, 80(344):174-181, April 1954. 7 figs., table, 5 refs. Also in: McGill Univ. Macdonald Physics Lab. Stormy Weather Research Group, Contract AF 19(122)-217, Scientific Report MW-16, January 1954. MH-BH, DWB—Stereoscopic cinephotos were made of snowflakes falling on to a black disc from which "melted diameter" D cm was measured. Rate of fall v cm/sec of different types of crystal was fitted by $v = kD^n$, where n is about 0.31 and k is 160 for dendrites and 234 for combinations of columns and plates. Rates of fall given by radar traces varied little with height up to 15,000 ft and were 2-3 times those of individual crystals, showing that aggregate snowflakes exist at all levels. *Subject Headings*: 1. Snowflake velocities. I. McGill Univ. Macdonald Physics Lab. Stormy Weather Research Group II. Contract AF 19(122)-217.—C.E.P.B.

5.8-214

551.578.46

Bader, Henri, *Sorge's law of densification of snow on high polar glaciers*. *Journal of Glaciology*, 2(15):319-323, April 1954. fig., table, 9 eqs. English and German summaries p. 319. DWB—E. SORGE (1935, 1938) applied the calculated increase of snow density with depth to determine annual accumulation of snow at Eismitte, Greenland, when annual layers cannot be distinguished. BADER puts Sorge's law into mathematical form and confirms its applicability. (See also 5.1-241, Jan. 1954, MAB.) *Subject Headings*: 1. Snow density. 2. Sorge, E.—C.E.P.B.

5.8-215

551.578.46(410)

Hawke, E. L. and Champion, D. L., *Report on the snow survey of Great Britain for the season 1952-53*. *Journal of Glaciology*, 2(15):356-362, April 1954. 2 figs. DWB—This regular annual report describes the season as one of moderate snowfalls. Duration of snow cover on 7 index mountains, shown in plate, was 79 days, same as average. Snowfall in coastal waters is summarized. *Subject Headings*: 1. Snow cover 2. British Isles.—C.E.P.B.

5.8-216

551.578.46:551.506.8

Kreeb, Karlheinz, *Die Schneeschmelze als phänologischer Faktor*. [Snow melt as a phenological factor.] *Meteorologische Rundschau*, 7(3/4):48-49, March/April 1954. fig., refs. DWB—Snow melt indicates microclimatic temperature distribution. It is an es-

pecially good phenological indicator in March and April. Differences are due to height and aspect of land, presence of forests, etc. and weather following snowfall. A chart of snow conditions in Neckar region on Feb. 22, 1952, is given. *Subject Headings: 1. Snow cover*
2. Phenology 3. Neckar Region, Germany.—C.E.P.B.

5.8-217

551.578.4

Kuhn, W., *Der Firnzuwachs pro 1951/52 in einigen schweizerischen Firngebieten*. [Firn accumulation during 1951/52 in some Swiss firn regions.] *Naturforschende Gesellschaft Zürich, Vierteljahresschrift*, 97(4):277-282, Dec. 31, 1952. fig. DWB—The course of the weather for the period 1951-52 is described with special reference to snowfall and snow accumulation. Dates are given on firn snow accumulation in the following areas: Clariden, Silvetta, Weissfluhjoch, Jungfraufirn and Bernina. It was found that although the snowfall on the glaciers was one of the heaviest on record, the snow levels in the firn regions were moderate and at higher elevations (Jungfraufirn and Bernina) were actually below average. The summer of 1952 was very warm so that extensive ablation occurred. In the Clariden region a permanent accumulation of firn occurred above a level of about 2800 meters. *Subject Headings: 1. Firn accumulation 2. Switzerland.—I.L.D.*

HYDROMETEOROLOGY

See also: Federal-State water supply forecasts (Work), 5.8-77.

5.8-218

551.579:551.4

Neumann, J., *On the water balance of Lake Tiberias 1935/36-1946/47*. *Israel Exploration Journal*, 3(4):246-249, 1953. 6 refs. Abstracted from reprint. GB-MO—In units of 10⁶ m³/yr: flow of Jordan into lake 560, precipitation over lake 65, other inflow into lake estimated as 135. Evaporation at 162 cm/yr=270, hence computed outflow 490. This nearly agrees with observed outflow (480). *Subject Headings: 1. Water balance 2. Lake Tiberias, Israel.—C.E.P.B.*

5.8-219

519.241.1:551.3

Sperling, Walter, *Zur Anwendung der Korrelationsrechnung in der Technik*. [The application of correlation calculation in technology.] *Die Wasserwirtschaft*, 44(5):122-128, Feb. 1954. DWB—Correlation coefficients and their use in technical investigation are explained in non-mathematical terms: linear relations (or relations transformable to linear) between 2 variables; correlation ratio for non-linear relations between 2 variables; multiple correlation of 3-6 linearly related variables. As example he discusses relation of (rainfall runoff) for year to seasonal temperatures and annual ground water, obtaining a regression equation with multiple correlation 0.95 [this does not agree with partial ccs]. Application to water investigations is discussed. *Subject Headings: 1. Correlation coefficients 2. Runoff.—C.E.P.B.*

5.8-220

551.57

*U. S. Corps of Engineers. *Snow Investigations, Lysimeter studies of clear weather snow melt at an unforested site*. U. S. Corps of Engineers. *Snow Investigations, Research No. 17*, Dec. 15, 1953. 24 p. 3 tables, 3 plates (fold.), 10 refs., eqs. DWB—Methods of computing runoff from snow melt are examined and compared. Experimental data are obtained from a model drainage basin located in an unforested site at a snow laboratory equipped with meteorological recording instruments. (Lower Meadow of Central Sierra Snow Laboratory, Spring 1952.) Analyses are presented of the thermal-budget method of computing snow melt and of various temperature-index methods in common use for the same purpose. Advantages and disadvantages of each method under varying conditions are discussed. Recommendations are made for future observations to more rigorously determine the causes of snow melt and to improve methods for its estimation. *Subject Headings: 1. Snow melt runoff 2. Snow melt 3. Experimental hydrology.—Author's abstract.*

5.8-221 551.579.4:551.577.37(411)
Common, Robert, **A report on the Lochaber, Appin and Benderloch floods, May 1953.** *British Geographical Magazine*, 70(1):6-20, April 1954. 10 figs., 4 plates, 6 refs. **DLC**—
Inverness and N. Argyll on May 24 and 25, 1953, heavy rain fell in a thunderstorm in
ply dissected hill country, 2.6 in. in 7 hrs on May 25 at Kinlochleven. River valleys were
ded and landslides caused great damage on hillsides. Many details are given. Part of
the William was flooded. *Subject Headings:* 1. Rainstorms 2. Floods 3. Scotland.—
P.B.

5.8-222 551.579.5
Ayer, H. S. (*U. S. W. B. Olympia, Wash.*), **Comparative readings of shaded and exposed
-moisture sticks at Olympia, Washington.** Olympia, Washington, U. S. W. B., Nov. 12,
1. [5 p.] fig. Mimeo. **DWB**—Comparative readings were made with two identical
dard Forest Service type fuel moisture sticks (one in an exposed and one in a shielded
tion) over a period of 33 days three times daily (Sept.-Oct. 1953). Curves of the average
es obtained with each instrument are presented. Interdiurnal variations of relative
lings on rainless days appear to be mainly dependent on amount of sunshine. During
dy weather the two sticks yield similar values, while the exposed stick is subject to greater
emes than the shielded one during sunny days, although their daily averages do not differ
stantially. *Subject Headings:* 1. Soil moisture measurement 2. Olympia, Wash. I. U. S.
ther Bureau.—G.T.

5.8-223 551.579.5
Verigin, N. N., **Dvizhenie vlagi v pochve.** [The movement of moisture in the soil.]
demia Nauk SSSR, Doklady, 89(2):229-232, 1953. fig. 15 refs., 13 eqs. **DLC**—A
hematical analysis of the movement of bound and free moisture in the soil under the
ptions that movement proceeds, in the absence of difference of temperature and salt
centration in the soil moisture, under the sole action of adsorptional, capillary and gravita-
al forces. Differential equations for the combined motion of free and bound moisture in
soil are derived. These are:

$$D \frac{\partial^2 u}{\partial y^2} + \gamma(a-u) = \frac{\partial u}{\partial t} \quad \text{and} \quad k \frac{\partial}{\partial y} \left[\left(\frac{w}{m-u} \right)^n \left(1 + \frac{\beta}{\gamma_0} \frac{\partial w}{\partial y} \right) \right] - \gamma(a-u) = \frac{\partial w}{\partial t}$$

hich D —coefficient of diffusion of bound moisture, u —content of bound water in the soil,
coefficient of moisture flow/second, a —molecular moisture capacity of the soil, γ —co-
nate, t —time; w —content of free moisture in the soil, m —porosity of soil, n —index of
ee of moisture pressure (3 to 4); γ_0 —specific weight of moisture; β —experimental constant
 $K = k_0/\mu$ (k_0 —permeability of soil) and μ —absolute viscosity of water. The equations
he approximate study of the movement of water involving gravity and capillary forces are:

$$kRw^{n-1} \frac{\partial w}{\partial y} = \frac{\partial w}{\partial y}, \quad R = \frac{n}{P^n} (1 + \Delta) \quad \text{and} \quad \Delta = \frac{1}{\gamma_0} \frac{\partial p_k}{\partial y},$$

re $P = m - a$ and p_k —capillary pressure; and

$$A \frac{\partial^2 \phi}{\partial y^2} + B \frac{\partial \phi}{\partial y} = \frac{\partial \phi}{\partial t}, \quad A = \frac{k\beta}{\gamma_0 P^n} (\phi_{cp})^{n/(n+1)}, \quad B = \frac{kn}{P^n} (\phi_{cp})^{(n-1)/(n+1)},$$

re $\phi = w^{n+1}$. *Subject Heading:* 1. Soil moisture movement.—I.L.D.

5.8-224 551.579.5:551.525.5
Weger, Nikolaus, **Die Wasserbewegung und die Wassergehaltsbestimmung in gefrorenem
en.** [Water movement and water content determination in frozen ground.] *Meteoro-
sche Rundschau*, 7(3/4):45-47, March/April 1954. 2 figs., 7 refs. **DWB**—Severe frost
page to roads in Jan.-Feb. 1953 was due to accumulation of ice and swelling in upper earth
ers and subsequent thaw from above, so that heavy traffic broke through. This is at-
tuted to forcing of water out of clay and transfer to higher layers by capillary action and
limation. Distribution of ground water at Geisenheim in Jan. 1953 is plotted down to
m. *Subject Headings:* 1. Soil moisture 2. Frozen soil.—C.E.P.B.

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

5.8-225

KHromov, S. P., **O sostoianii i zadachakh sovetskoï klimatologii.** [Status and task of Soviet climatology.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geograficheskaja*, 3:75-86, 1954. 35 refs. **DLC**—A theoretical paper in which, after having presented a historical survey of the gradual detachment of climatology from meteorology and the conversion of climatology into an independent branch of geographical science (VOEIKOV), the author outlines its actual scope and delineates the vastness of its impending tasks in connection with the approaching realization of Stalin's plan of reclamation. The author draws the following main conclusions: 1) Soviet climatology, which is a continuation of Russian classic climatology (VOEIKOV), thus surpasses in regard to its methodological level and its concrete methods of analysis, the standard of foreign climatology; 2) this high methodological level has been reached because Soviet climatology is based on the principle of dialectic materialism and is inspired by the great task of communist building; 3) the basic method of representing climate, the statistical analysis of many years of observation of individual meteorological elements, remains in force, yet it can be profitably improved by methods of complex climatology and synoptic investigation of climate-forming processes. Main tasks standing ahead are: to continue and carry out a detailed and effective climatological investigation of the whole territory of the Union; to work up properly the climatology of the free atmosphere above the country; to deepen the notion of climate genesis in the whole world; to expand the bond between climatology and the cultural problems of the country, climatic amelioration and the great constructions of communism; to work out methods of forecalculating the impending changes of climate, resulting from the realization of the plan of climatic amelioration. *Subject Headings: 1. Climatology 2. U.S.S.R.—A.M.P.*

5.8-226

†Neumann, Gerhard J., **Der Einfluss klimatischer Faktoren auf Siedlung und Wohnbaukunst.** [The influence of climatic factors on settlement and domestic architecture.] *Petermanns Geographische Mitteilungen*, 98(1):13-17, 1954. 35 refs. **DWB**—The influence of local climate on settlement is outlined with examples from all parts of the world, such as planting trees as a protection against wind (Canada) or sun (Argentina), avoidance of extreme temperatures in valley bottoms, or mobile dwellings of extreme mountain climates. Choice of building material depends on climate and nature of ground. Roofs are steeply ridged in rainy or snowy climates, round in dry climates, flat (for sleeping) in Mediterranean, etc. In rainy regions walls on weather side are protected by slats or outbuildings. Ground level depends largely on temperature and sunshine, affecting verandas, gardens and decorations. *Subject Headings: 1. Climatic influences 2. Building design.—C.E.P.B.*

5.8-227

Okolowicz, Wincenty, **Klimatologia jako nauka i jej stosunek do meteorologii i geografii fizycznej.** [Climatology as a science and its relation to meteorology and physical geography.] *Przegląd Geograficzny*, Warsaw, 24(3):27-48, 1952. In Polish; Russian and English summaries p. 46-48. **DLC**—A theoretical discussion of the subject matter of climatology as a separate science as well as an explanation of how this science differs from physical geography. In meteorology is presented. It is shown that in contrast to meteorology, which is not concerned with climate as a whole but measures its elements and the relations within them, as in physical geography, which deals with climate solely in conjunction with other elements of the geographical environment, climatology is concerned not with individual elements of climate but with weather conditions as an entity over a definite territory. The paper concludes with a survey of future development of climatology in Poland. *Subject Headings: 1. Climatology 2. Meteorology 3. Physical geography.—A.M.P.*

5.8-228

Pogosian, KH. P., **O sovremennom polozhenii klimatologii.** [The current state of climatology.] *Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia*, 84(5):49-55, 1952. 35 refs. **DLC**—A theoretical paper in which, after having presented a historical survey of the gradual detachment of climatology from meteorology and the conversion of climatology into an independent branch of geographical science (VOEIKOV), the author outlines its actual scope and delineates the vastness of its impending tasks in connection with the approaching realization of Stalin's plan of reclamation. The author draws the following main conclusions: 1) Soviet climatology, which is a continuation of Russian classic climatology (VOEIKOV), thus surpasses in regard to its methodological level and its concrete methods of analysis, the standard of foreign climatology; 2) this high methodological level has been reached because Soviet climatology is based on the principle of dialectic materialism and is inspired by the great task of communist building; 3) the basic method of representing climate, the statistical analysis of many years of observation of individual meteorological elements, remains in force, yet it can be profitably improved by methods of complex climatology and synoptic investigation of climate-forming processes. Main tasks standing ahead are: to continue and carry out a detailed and effective climatological investigation of the whole territory of the Union; to work up properly the climatology of the free atmosphere above the country; to deepen the notion of climate genesis in the whole world; to expand the bond between climatology and the cultural problems of the country, climatic amelioration and the great constructions of communism; to work out methods of forecalculating the impending changes of climate, resulting from the realization of the plan of climatic amelioration. *Subject Headings: 1. Climatology 2. U.S.S.R.—A.M.P.*

pt./Oct. 1952. bibliog. p. 500. **DLC**—The author defends his earlier criticism of climatology in the U.S.S.R., as being too descriptive, not sufficiently theoretical, and as not conscious of much of its possible applicability. Some of the attainments of Soviet climatology during the 20's and 30's are reviewed. Especially criticized are the views of G. T. SELIANINOV (see 4.4-230, April 1953, *MAB*) who underestimates the importance of applied climatology in industry, and neglects theoretical climatology. For SELIANINOV's reply to this paper, see item 5.7-171, July 1954, *MAB*. **Subject Headings:** 1. Climatological research 2. U.S.S.R. Selianinov, G. T.—*I.L.D.*

5.8-229 551.58:519.2(02)
 *Van der Bijl, Willem, **Toepassing van statistische methoden in de klimatologie.** [Applications of statistical methods in climatology.] *Netherlands. (K.) Meteorologisch Instituut, Mededelingen en Verhandelingen, Ser. A, No. 58, 1952.* 197 p. 19 figs., 23 tables, eqs., bibliog. 185-195. **DWB**—Only two other works exist, as far as is known, which compare with this recently edited and printed edition on statistics in climatology, namely CONRAD and POLLAK (see item 2.1-150, Jan. 1951, *MAB*) and BROOKS and CARRUTHERS (see item 4.6-2, June 1953, *MAB*), the first on climatology and the second applicable to all of meteorology, as well as climatology. The general nature of statistics as well as climatology is first discussed, then the basic formulas which are needed to handle statistical work in climatology are presented and elaborated on. In the second chapter actual climatological data are analyzed by statistical methods. Deviations, Gaussian, Poisson's and Bernoulli distributions, tests of significance (student's, Fisher's and others), simple and multiple regression and correlation, etc. are treated by means of examples from various parts of the earth. Chap. 3 treats of sampling errors, and booby traps that may beset the unwary in handling geophysical data by statistical means, where care is not taken. Size of sample, representativeness of sample (bias), persistence, pseudocorrelation, related variables, etc. are shown to be aspects to watch carefully if the statistics are to be of any value. Chap. 4 contains examples of more elaborate statistical applications in the realm of climatology, taken from the literature and critically examined. A bibliography of 160 items is appended. **Subject Headings:** 1. Statistical methods in climatology 2. Textbooks.—*M.R.*

CLIMATE OF PARTICULAR PLACES

See also: **Climatology of Halle, Saxony** (Hoelscher), 5.8-37; **Climate of Rhodesia and Nyasaland** (Howe), 5.8-249.

5.8-230 551.582(673)
 *Boss, G., **Klimastudie über Angola.** [Climatic study of Angola.] *Meteorologische Rundschau*, 7(1/2):10-13, Jan./Feb. 1954. 6 figs., 4 tables. **DWB**—Data include monthly rainfall at Cabuta in a patch of forest 150 km inland near Cuanza R. in Portuguese Angola, notes on thunder, days of dew and mist, and diurnal variation on selected days of evaporation and vapor pressure. Some data are also given for Nhia in bush near coast. The effect of the climate on banana and coffee plantations is discussed. **Subject Headings:** 1. Local climates 2. Climate of Angola 3. Angola.—*C.E.P.B.*

5.8-231 551.582.2(569.4)
 *Ashbel, Dov (*Hebrew Univ., Met. Dept.*), **Climate of Jerusalem. A century of meteorological observations, 1846-1952.** Jerusalem, Meteorological Dept., Hebrew Univ., 1953. p. mostly tables. refs. Mimeo. **DWB**—Extensive tables give monthly and annual pressure, sunshine, wind speed and direction, temperature, soil temperature, evaporation, rainfall, solar radiation, cooling power, average hourly temperature and humidity and wind, door temperature, daily temperature, wind flow and sunshine, etc. In some cases data are given for each month since 1846 (precipitation), 1861 (pressure) and 1882 (temperature), frequencies of temperatures (in hours) for each month according to 5°C class intervals are also given. Sites and periods of record for all location since 1846 are given. **Subject Headings:** 1. Climate of Jerusalem 2. Climatic data 3. Long period records 4. Urban climates 5. Jerusalem.—*M.R.*

5.8-232

551.582.2(4)

†Bonasera, Francesco (*Geophysical Obser., Urbino, Italy*), *Il clima del Territorio di Urbino. Contributo allo studio della climatologia marchigiana.* [Climate of the Territory of Urbino. A contribution to the study of the climate of Marches.] *Urbino, Italy. Università Degli Studi. Osservatorio Geofisico, Serie B*, No. 18, 1953. 56 p. 13 figs., 2 tables (fold.), 33 refs. port. (of Alessandro Serpieri). In Italian; English summary p. 56. **DWB**—A nicely edited and thorough job of analysis of the temperature, pressure, cloudiness, wind, rainfall and humidity records (1887-1936) for the Urbino district of Marches Province, Italy (along Adriatic near Florence). The data sheet and graphs showing the mean monthly course of the elements are on extended sheets so they can be studied in connection with the text and analysis of each element. Geographical aspects and history of records are given proper consideration. The local climate of the valleys, etc. is emphasized (though not the urban climate) and compared with that of Pesaro District (adjacent). *Subject Headings:* 1. Climatic data 2. Climate of Urbino, Italy 3. Urban climates 4. Long period records 5. Urbino, Italy.—*M.R.*

5.8-233

551.582.2(4)

*Bonasera, Francesco, *Il clima di Urbino nel triennio 1949-1951.* [Climate of Urbino the three year period, 1949-1951.] *Urbino, Italy. Università Degli Studi. Osservatorio Geofisico, Serie B* (unnumbered), 1952. 10 p. tables. **DWB**—Contains two page data summary (of normal elements including vapor pressure) by months and for the year for each year 1949, 1950 and 1951, and a brief analysis with graphs. *Subject Headings:* 1. Climatic data 2. Climate of Urbino, Italy 3. Urban climates 4. Urbino, Italy.—*M.R.*

5.8-234

551.583.2(4)

Bories, P., *Contribution à l'étude de la climatologie en France au cours des siècles passés.* [A contribution to the study of climatology in France during the past centuries.] *La Météorologie*, Paris, 4th Ser., No. 30:150-155, April/June 1953. In French; French, English and Italian summaries p. 150. **DWB**—Extracts from the chronicles for the years 1336-1727 compiled for Villefranche by ÉTIENNE CABROL (1654-1742) in the form of 2 large volumes—382 and 434 pages each. This record for Villefranche is the only one of its kind for Rouergue as it gives a consistent picture of cold and warm winters, heavy rains 1663, 1712, 1725, and droughts 1536, 1716, 1721 a number of accounts of which are reprinted. Cold winters were 1608, 1678, 1709, 1710, 1713, 1715, 1716, 1718, 1726, 1729; warm winter 1619. Early winter 1727. *Subject Headings:* 1. Historic weather records 2. Extreme winters 3. Droughts 4. Climate of Rouergue, France 5. Rouergue, France.—*M.R.*

5.8-235

551.582.2(4)

*Donà, Ferdinando, *Il clima nelle conche dei laghi di Léxico e di Caldonazzo.* [Climate of the Basin of the Léxico and Caldonazzo Lakes.] *Padua. Università. Istituto di Geografia e Geofisica, Pubblicazioni, New Ser.*, No. 8, [1952?] figs., tables, refs. Reprint of a section (p. 43-106) of v. 1 of "I Laghi di Caldonazzo e di Léxico." Bologna, Centro di Studi per la Geografia Fisica, 1952. In Italian; English summary p. 41. **DWB**—A thorough analysis (for the benefit of limnologists) of all of the available climatic data for the basin of the two lakes Léxico and Caldonazzo in the province of Venezia Tridentina at the foot of the Alps. The main emphasis is on temperature, humidity, precipitation and wind, but each element is taken up in many of its aspects, with illustrative tables and charts. Snow is another important element at the height of 1100 m. The ground is almost always covered with snow from Jan. 15 to March 5. The data are mainly from records since 1920 at 6 or 7 stations (Perle, Trento, Léxico, Tenna, Centa, Lavarone and Vetriolo). *Subject Headings:* 1. Climate of Venezia Tridentina, Italy 2. Climatic data 3. Caldonazzo Basin, Italy.—*M.R.*

5.8-236

551.582.2(4)

*Giovannelli, J. (*Met. Service, New Caledonia*), *Le climat de la Nouvelle-Calédonie.* [Climate of New Caledonia.] Nouméa, Imprimeries Réunies, 1953. 37 p. tables (some fold.), figs. **DWB**—The data for a number of stations in New Caledonia (8 to 40 years records) are summarized and analyzed in the 12 short chapters of this handy monograph. They include: 1) geographic factors; 2) seasonal variations in the general climate; 3) temperature

humidity; 5) pressure; 6) rainfall; 7) rainfall extremes; 8) cloudiness, sunshine; 9) surface winds; 10) winds aloft; 11) various phenomena (thunder, lightning, hail, dew, visibility, fog) and 12) tropical cyclones. Appended are monthly and annual means of precipitation (15 stations), number of days with precipitation, temperature data (13 stations), etc. In addition illustrative tables, charts, diagrams and synoptic maps are scattered throughout the text. It is concluded that New Caldeonia is in the "comfort zone" for human activity. *Subject Headings:* 1. Climatic data 2. Climate of New Caledonia 3. New Caledonia.—M.R.

5.8-237

551.582.2(4/91)

*Würfel, Heinz, *Zu Pilgrams Untersuchungen über das Wahrscheinliche der Wetterkunde durch vieljährige Beobachtungen*. [On Pilgram's investigations on the probable in weather science on the basis of long term observations.] *Zeitschrift für Meteorologie*, 6(10):316-319, Oct. 1952. table, 6 refs. MH-BH—A. PILGRAM's book "Untersuchungen über das Wahrscheinliche der Wetterkunde durch vieljährige Beobachtungen" which appeared in 1788 contains weather data extending in part over a hundred years for many parts of the world but particularly for Vienna. Weather data for every day for the interval 1762-1786 are given. The mean monthly frequencies of clear and cloudy days of thunderstorms and of precipitation are given in a table and are compared with the 40-year mean of similar data for Vienna. The graphs show the typical singularities of the ideal annual course of weather. PILGRAM's dates for the occurrence of weather singularities correspond to those of to-day. *Subject Headings:* 1. World climates 2. Singularities 3. Climate of Vienna 4. Vienna, Austria. I. Pilgram, A.—I.L.D.

CLIMATIC VARIATIONS

5.8-238

551.583

*Ostrowski, Jerzy, *Zmiany klimatyczne i zmiany fauny a "stepowienie."* [Climatic variation and changes in fauna with a view to the gradual transformation of the country into a steppe.] *Gospodarka Wodna*, Warsaw, 13(5):176-179, May 1953. 6 tables. DLC—This is a report presented at the 3rd Scientific and Technical Conference on Irrigation, Drainage and Conservation at which the question of a gradual transformation of the country into a steppe was discussed. On the basis of a detailed study and comparison of precipitation amount variations during the growing seasons of the periods 1851-1909 and 1931-1952 the author comes to the conclusion that a certain increase of oceanicity (of the climate) is observable. Observed changes in the fauna (especially the decrease of the number of marshland animals) is caused by the reclamation of swamps which is not equivalent to transformation into steppe. *Subject Headings:* 1. Climatic variations 2. Steppe climates 3. Long period records 4. Poland.—A.M.P.

5.8-239

551.583.14(94)

*Gentilli, Joseph (*Univ. of W. Australia, Nedlands*), *Present climatic fluctuations in Western Australia*. *Western Australian Naturalist*, Perth, 3(7):155-165, Dec. 30, 1952. 2 figs., 12 tables. Abstracted from reprint. NNA—Trends are examined by fitting "least square" straight lines to long rainfall series at Perth, Albany and Onslow and temperature at Perth. These show small but definite changes. Winter rainfall has increased appreciably, summer rainfall decreased slightly. Perth became warmer in winter. Köppen's types of climate are plotted year by year 1928-1945. *Subject Headings:* 1. Climatic trends 2. Australia.—C.E.P.B.

5.8-240

551.583.3

Bacsák, György, *A jégkorszakok kialakulásáról*. [Causes of ice ages.] *Időjárás*, Budapest, 57(5):314-316, Sept./Oct. 1953. 2 figs. DLC, MH-BH—The formation of extensive glaciers in Scandinavia and Finland during ice ages proves that winters were mild at those times. Ice ages, consequently, could not be due to a general decrease of insolation as claimed in certain theories (meteoric cloud theory, etc.). The actual reasons of the formation of ice ages are: a) meandering of the earth's axis (26,000-year period) and b) changes in the elliptic shape of the earth's path around the sun (causing changes in the relative amounts of summer and winter insolation). There is agreement between astronomically calculated

periods of the above factors and geologic traces of ice ages. It would be wrong, however, apply the same explanation to short-term climatic fluctuations, such as can be experienced within a few decades. *Subject Heading: 1. Glacial periods.—G.T.*

5.8-241

551.583.3:551.43(1)

Büdel, Julius, *Klima-morphologische Arbeiten in Äthiopien im Frühjahr 1953*. [Climatic morphological work in Ethiopia in the spring of 1953.] *Erdkunde*, 8(2):139-156, April 1954, 26 figs., 26 refs. English summary p. 139-140. DLC—The high plateaus of Amhara, Kaffa, Somaliland are divided into horizontal and vertical zones in which the land forms are related to present and past climates. In the S.W. the humid tropical zone extends up to 2000-2500 m, followed by Dega zone to forest limit at 4200 m, with deep soils due to solifluction in an early Pluvial (recently renewed by plough culture). Above this is the frost zone. In the N. is the Dankali desert into which the zone of humid climate advanced during Pluvials. *Subject Headings: 1. Climatic effects 2. Land forms 3. Ethiopia.—C.E.P.B.*

5.8-242

551.58

Keindl, Josef, *Die Ursachen der Eiszeiten*. [The causes of Ice Ages.] *Petermanns Geographische Mitteilungen*, 98(1):26-27, 1954. 4 refs. DWB—Ice Ages are periodic intervals of about 2×10^5 years. This can only be due to the evolution of stars or revolution of the solar system about the center of the Milky Way. The first is improbable because earth's geological temperature range of 20-25°C is relatively small. The second takes sun through a cosmic dust cloud at intervals of 230 million years. Meteorites have been found in Pleistocene but not in earlier deposits. *Subject Heading: 1. Glacial periods.—C.E.P.B.*

MICROCLIMATOLOGY

See also: *Micromet. instrumentation* (Gill), 5.8-45; *Temp. measurements on plants* (Kreeb), 5.8-54.

5.8-243

551.584:551.58

†Höhne, Werner, *Experimentelle und mikroklimatische Untersuchungen an Kleingewässern*. [Experimental and microclimatic investigations on small water areas.] *Germanische Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen*, 4(26), 1954. 56 p. 16 figs., 5 tables, 66 refs., eqs. DWB—Recordings were made in thin metal containers of 80 cm diameter buried in grassy soil at Etzdorf, Saxony. The thermoelectric thermometer and psychrometer are described. Results are used to evaluate distribution of surface temperature in relation to wind, diurnal and annual variation of temperature at different depths, difference between water and air temperature, effect of clouds and supercooling preceding freezing. Water temperature was little influenced by rapid changes of air temperature. Mean was almost independent of depth between 2 and 40 cm but diurnal range decreased with increasing depth. At the surface range was inversely proportional to fourth root of depth. Effect on microclimatology was small; immediately above surface vapor pressure was even a little lower than over neighboring grass. Wind and convection currents in the water are described. *Subject Headings: 1. Microclimatology of pools 2. Water temperature of pools.—C.E.P.B.*

5.8-244

551.58

†*Cantlon, John E., *Vegetation and microclimates on north and south slopes of Cuckoo Mountain, New Jersey*. *Ecological Monographs*, Durham, N. C., 23(3):241-270, July 1953, 9 figs., 16 tables, bibliog. p. 268-270. DWB—This study represents an analysis of the vegetation and microclimates of the north and south facing slopes of the ridge in central New Jersey. Microclimatic observations including air temperatures and vapor pressure at 5 cm, 20 cm, 1 m and 2 m above the ground. Soil temperatures and wind velocity were obtained from the most part from 2 pairs of stations on each slope during spring, summer and fall. Differences in insulation produced two different microclimates. The south slope was characterized by two types of daytime microclimatic air temperature, profile in the lower 2 m was almost isothermal for heavy shade but shows sharp changes for light shade. In the north slope

temperature decreased towards the ground in all climates. During the growing season or pressure decreased towards the ground on both slopes but more sharply on the north. The greatest difference in microclimate between the two slopes was found in the lowest n. The structure and composition of the vegetation of the two slopes and its variation in soil temperature and microclimatic air temperatures during the various seasons is described and the microclimatic data are presented in tables. *Subject Headings: 1. Microclimate slopes 2. Microclimatic data 3. Cuckett Mountain, New Jersey.—I.L.D.*

5.8-245 551.584.61
Kosmodamianskaia, D. M., *Mikroklimat sel'skikh zhilishch iz mestnogo ognestoikogo materiala v usloviakh Zavolzh'ia*. [Microclimate of rural houses made of fire-resistant material in the Trans-Volga region.] *Gigiena i Sanitariia*, Moscow, No. 7:13-17, 1953. **DLC**—The houses were constructed of sandstone blocks, floors were wooden and roofs of wooden planks. Relative humidity was measured at 0.15 and 1.5 m above the floor and temperature at 1.5 m above the floor thrice daily. Also skin temperatures were measured. Data are given on the variation of the meteorological variables during the summer and winter of 11 days, their relationship to outdoor temperature and the comfort sensations of the inhabitants. *Subject Headings: 1. Indoor climates 2. Microclimatology 3. Trans-Volga region, U.S.S.R.—I.L.D.*

5.8-246 551.584.61:615.8
Levina, A. I. and Ivannikova, T. F., *Meteorologicheskie usloviia v rabochikh pomesheniakh ekskavatorov dlia srednei polosy SSSR*. [Meteorological conditions in worker's houses in excavators in Central U.S.S.R.] *Gigiena i Sanitariia*, Moscow, No. 6:14-16, 1953. **DLC**—The meteorological conditions, namely air temperature and movement and relative humidity within the work cabin and the machine shop of excavating projects are described. The air temperature difference between interior and outside air varied with excavations and did not exceed the official standards during the warm season. The relative humidity of the air varied between 32-65% while the outdoor relative humidity varied between 36 and 76%; the air movement near the work stands ranged between 0.1 and 0.5 m/sec. The warmth sensations of the machinists and their helpers were different for the same air temperatures because of varying exposure to uncomfortable conditions. Methods of increasing comfort especially by means of air movement at place of work are suggested. *Subject Headings: 1. Indoor climates 2. Comfort climate 3. Central U.S.S.R.—I.L.D.*

5.8-247 551.584.61:551.524
Makjanić, B., *O temperaturnim prilikama u sobi*. [Features of room temperature.] *Jugoslavija. Hidrometeorološka Služba, Vesnik*, 2(1):17-20, Jan./March 1953. 2 figs. **DWB**—Data obtained in a single series of temperature measurements in the author's room are presented. The effects of vertical temperature distribution in the room on the comfort of children and adults and on the accuracy of readings of mercury barometers are discussed. The influence of various factors, such as orientation of the room and air circulation within the room, upon horizontal and vertical temperature distribution is considered. *Subject Headings: 1. Indoor temperatures.—G.T.*

5.8-248 551.584.61:69
Neumann, H., Peleg, M. and Robinson, N., *Research on indoor climate. Thermal measurements on objects in the Jordan Valley*. Haifa. Hebrew Institute of Technology. *Journal for Technical Climatology, Bulletin*, No. 4, 1953. 24 p. 13 figs., table, refs. Text in English; title-page and legends to figs. in English and Hebrew. **DWB**—Calculations of indoor climate with the use of the coefficient of heat transfer do not take into consideration extensive variations in outside temperature. Accordingly the most important factors influencing the indoor temperature of walls can be obtained by measuring separately the temperature of individual wall and roof objects as a function of circulation, thickness, type of concrete, and materials, and outer treatment. Measurements were carried out for several summer months at Maos-Haim, situated in a depression of about 250 meters near the Jordan River. Data on temperature variations are presented in tables and graphs, and diagrams of experimental

design are given. The results indicate that: 1) orientation of walls affects temperature slightly; 2) thickness of the walls does not affect the average temperature on the inner surface; 3) special types of concrete show a lower temperature day and night; 4) various materials did not affect the average temperature; 5) various means of outer treatment of wall temperature. *Subject Headings: 1. Indoor climates 2. Building design 3. Maos-H Israel.—I.L.D.*

CLIMATIC CLASSIFICATION

5.8-249

551.585:551.582.1 (689, 6)

Howe, G. Melvyn, *Climates of the Rhodesias and Nyasaland according to the Thornthwaite classification*. *Geographical Review*, N. Y., 43(4):525-539, Oct. 1953. 7 figs., 17 tables, 17 refs. **DWB**—The climate of Rhodesia and Nyasaland, in particular the rainfall and temperature regime, is described qualitatively. Using Thornthwaite's classification the author calculated water deficiencies and water surplus for various stations and determined the moisture balance, moisture regions, seasonal variation of effective moisture, and summer concentration of thermal efficiency. Maps showing these features and graphs of the annual march of evapotranspiration at selected stations are presented. Broad correlations between natural vegetation association and evapotranspiration data are indicated. *Subject Headings: 1. Thornthwaite's classification 2. Climate of Rhodesia and Nyasaland 3. Rhodesia 4. Nyasaland.—I.L.D.*

5.8-250

551.585:551.582.1 (689, 6)

†Lehmann, H.; Roglič, J.; Rathjens, C.; Lasserre, G. and others, *Das Karstphänomen in den verschiedenen Klimazonen. I. Bericht von der Arbeitstagung der Internationalen Karstkommission. 2. Der Karst der humiden heissen und sommerheissen Gebiete Ostasien. 3. Der tropische Kegelkarst auf den Grossen Antillen*. [Karst phenomena in the different climatic zones. 1. Report on the work of the International Karst Commission. 2. The Karst of the humid hot and summer-hot regions of East Asia. 3. The tropical high Karst of the Greater Antilles.] *Erdkunde*, 8(2):112-139, April 1954. 22 figs., 7 photos, 46 refs. Summary p. 112, 122. **DLC**—The first meeting of the Commission on Karst phenomena took place at Frankfurt a.M., Dec. 27-30, 1953. Pt. 1 of this summary deals with a discussion of the origin of Karst, opened by J. ROGLIČ who attributed the Dinaric Karst plains to bioclimatic corrosion in a warmer Pliocene climate. Other speakers described Karst formation in various types of climate from tropical to polar. In Pt. 2 H. VON WISSMANN described the "Karst à piston" in the perhumid subtropics of southern China and in S.E. Asia, Sumatra, Cuba. In Pt. 3 H. LEHMANN described similar types in the Greater Antilles, including montane Pleistocene and coastal formations. *Subject Headings: 1. Climatic effects 2. Karst 3. Wissmann, H. II. Harrassowitz, H. III. Corbel, J. IV. Birot, P.—C.E.P.B.*

BIOCLIMATOLOGY

See also: Climate, weather, man (Seybold), 5.8-10; *Influence of seasonal conditions on infant mortality . . .* (Wright, G., Wright, E.), 5.8-144; *Rapid electric or electromagnetic field changes and biomet. reactions* (Reiter), 5.8-278

5.8-251

551.586:06 (689, 6)

Burckhardt, Hans, *Drei Jahrzehnte Organisation bioklimatischer Arbeit in Deutschland*. [Three decades of the organization of bioclimatic work in Germany.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 9:81-89, 1954. 4 refs. **MH-BH**—The development of bioclimatology was two-fold in evaluation of biotropical weather processes and climatotherapy. A brief history is given, with names but few references, with emphasis on the work of German climatic health resorts and, later, the biometeorological research in the field. *Subject Headings: 1. Bioclimatic research 2. History of bioclimatology 3. Germany.—C.E.P.B.*

5.8-252

551.586:06 (689, 6)

Koïranskii, B. B. and Ukvol'berg, L. IA., *O metodike postroeniia proizvodstvennogo komforta*. [Method for establishing comfort zones in industry.] *Gigiena i Sanitariya*, 1954, 1(1):1-10, 1 fig., 10 refs. **MD**—The method for establishing comfort zones in industry is described. The method is based on the results of experiments on the effect of various factors on the human body. *Subject Headings: 1. Comfort 2. Industry 3. Method.—I.L.D.*

oscow, No. 8:30-39, Aug. 1953. 5 tables, refs. **DLC**—The effects of microclimatic conditions upon the heat balance of 6 individuals working with an energy expenditure of 1.5 kg l/min was observed over a period of 5 years. Data are given on the effect of physical work on heat balance of the individual, effect of meteorological conditions upon type of clothing, effect of mean radiant temperature upon heat balance and of wind velocity upon heat balance; data include measurements of skin and body temperature and of ambient temperature, relative humidity, wind velocity and radiant temperature. *Subject Headings:* 1. Thermal balance of human body 2. Skin temperature 3. Body temperatures 4. Comfort zones 5. Industrial climatology.—*I.L.D.*

5.8-253

551.586:612

Slonim, A. D., **Signal'nye faktory vneshnei sredy i ikh znachenie dlia meditsinskoi klimatologii.** [Signal factors of environment and their significance in medical climatology.] *Gigiena i Sanitariia*, Moscow, No. 7:3-11, 1953. **DLC**—The author examines the possibility of applying the principles of the conditioned reflex to analysis of the action of the meteorological variables upon physiological processes and reviews various studies involving the application of this approach. These include the nervous response to air movement apart from its cooling effect (I. A. OPONIN), the effect of change in working position upon heat regulation in man (S. PONUGAEV and O. I. MARGOLIN), effect of radiant heat loss upon respiratory exchange and skin temperature, action of light upon metabolism and its relation to physiological rhythm, adaptation to cold by training and hardening, etc. *Subject Headings:* 1. Medical climatology 2. Physiological climatology.—*I.L.D.*

5.8-254

551.586:612.014.4

Vetoshkin, S. I., **Okhlazhdenie organizma cheloveka v zavisimosti ot vertikal'nykh izmenenii temperatury vozdukhnoi sredy v zhilishche.** [The chilling of the human organism as function of the vertical lapse of air temperature in dwellings.] *Gigiena i Sanitariia*, Moscow, No. 8:17-22, Aug. 1952. 4 figs., table. **DLC**—Lightly clothed individuals performing mental work were subjected to room conditions in which the horizontal temperature gradient was slight and the vertical temperature gradient between the floor to a height of 1.5 meters varied, and skin temperature, flow of nasal mucosa and temperature of the skin and of the spine and subjective feelings of comfort and discomfort were recorded. The resulting measurements were divided into two groups according to whether the vertical temperature between the floor and 1.5 m was greater or less than 4°C. The first group was characterized by a fall of 7.0-10.2°C in temperature of the skin of the toes and by discomfort; the second group was marked by a slight change in toe temperature over a period of 3-4 hours and by comfort. *Subject Headings:* 1. Bioclimatology 2. Physiological climatology.—*I.L.D.*

5.8-255

551.586:612.1

Caroli, G. and Pichotka, J., **Weitere Untersuchungen zur Beziehung zwischen Blutgerinnung und Wetter.** [Further researches into the relation between blood coagulation and weather.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 5(3/4):403-412, 1954. 2 figs., tables, 11 refs. German, English and French summaries p. 403-404. **DLC**—Two series of observations of coagulation times of blood of rabbits and titration times of sodium thiosulphate in iodine solution had correlation of about 0.6. Coagulation time had a small (0.136±.118) correlation with pressure, none with pressure changes and little with cosmic rays. Hourly values of coagulation and titration times showed marked increases at passage of fronts and showers; after cold fronts times remained high for some hours. Relations were considered to act through short electromagnetic waves or radioactive radiation. *Subject Headings:* 1. Bioclimatic research.—*C.E.P.B.*

5.8-256

551.586:612.27

CHekin, V. IA., **K voprosu o vliianii meteorologicheskikh faktorov na sosudistyĭ tonus.** [The influence of meteorological factors on vascular tone.] *Terapevticheskii Arkhiv*, Moscow, (1):71-73, Jan./Feb. 1953. 6 refs. **DLC**—The nervous origin of hypertensive diseases is pointed out. The influence of atmospheric pressure upon vascular tone was investigated by measuring the arterial pressure of 512 males in a northern region during seasons when the barometric pressure varies 30-40 mm a day. Blood pressure was found to vary with changes

in atmospheric pressure; and the variation was greatest in diastolic pressure. At an atmospheric pressure of 765-770 mm the systolic pressure was raised in 5.8% of the cases. 742-745 mm systolic pressure increased among a larger number of individuals and at 702- the systolic pressure was higher among 10.5% of the subjects. The diastolic pressure showed increase of 10.3% to 16.5% and 28% for the same atmospheric pressures. *Subject Headings:* 1. Atmospheric pressure effects 2. Blood pressure.—*I.L.D.*

5.8-257

551.586:

Ungeheuer, H., *Mensch und Wetter. Der gegenwärtige Stand der medizin-meteorologischen Forschung.* [Man and weather. The present position of medical meteorology investigation.] *Umschau*, 54(9):257-260, May 1, 1954. 5 figs., table. **DWB**—Statistics and experiment show that many diseases are definitely influenced by weather processes, others probably and some possibly (table) when other conditions are favorable. This influence acts through the vegetative nervous system, but differently in different men. Deaths are more frequent in disturbed than in undisturbed weather; many other cases are cited. Five types of synoptic chart illustrating passage of an anticyclone and frontal depression across western and central Europe are shown and their medical effects summarized. A basis for pathogenic forecasting is being set up by daily discussions between meteorologists and doctors. *Subject Heading:* 1. Medical meteorology.—*C.E.P.B.*

5.8-258

551.586:61

Menger, W. and Stranz, D., *Zur Meteorotropie der Tuberkulose bei Kindern.* [On the meteorotropism of tuberculosis in children.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 9:90-94, 1954. 2 tables, 7 refs. **MH-BH**—The seasonal crisis of tuberculosis in spring in Mainz is attributed to a change of disposition under the influence of D₁ radiation. Crises occur mostly 1-2 days after the end of a period of 4-10 days of quiet anticyclonic weather. Meningitis follows a similar course. It is attributed to stagnating air, especially in winter. *Subject Headings:* 1. Medical meteorology 2. Tuberculosis 3. Children.—*C.E.P.B.*

5.8-259

551.586:616.24:5

Geppert, Maria-Pia, *Zur statistischen Methodik der bioklimatischen Forschung.* [Statistical techniques in bioclimatic research.] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 9:21-25, 1954. 4 tables, 11 refs., 9 eqs. **MH-BH**—W. SANDRITTER, F. BECKER (*Deutsch. med. Wochenschrift*, 76:1526, 1951) analyzed 26,200 observations of relation of lung embolism to 8 types of weather disturbances. Author converts these observations into tetrachoric (2×2) tables and tests probabilities of real connections by chi-square and other correct statistical methods. This shows significant relations ($P < 0.01$) between embolism and 5 of the 8 types of disturbances. *Subject Headings:* 1. Statistical analysis 2. Respiratory diseases. I. Sandritter, W. II. Becker, F.—*C.E.P.B.*

5.8-260

551.586:

Jovičić, S., *O problemu klimatizacije.* [The problem of air conditioning.] *Yugoslav Hidrometeorološka Služba, Vesnik*, 2(2):61-63, April/June 1953. fig., tables. **DWB**—Review of an article by A. R. WEILLER in *La Météorologie* (Oct./Dec. 1950). Considering that optimum indoor temperature varies according to the outdoor temperature to which the human body has become adapted, the author presents a table of ideal indoor temperature as a function of outdoor temperature. According to the table, desirable indoor and outdoor temperatures are equal at 20°C. Below that value indoor temperature should decrease 1° for each 1° lower outdoor temperature; above 20°C it should increase 1° for each 2° of higher outdoor temperature. Corresponding values of optimum humidity and wind are also tabulated. (For original article see item 2.9-163, Sept. 1951, *MAB*.) *Subject Headings:* 1. Air conditioning 2. Serbocroatian language 3. Reviews. I. Weiller, A. R.—*G.T.*

5.8-261

551.586:

Ljubinković, B., *Klimatski uslovi pojave i širenja plamenjače vinove loze i ogled sproveden na njenom suzbijanju 1952 godine.* [Climatic requirements of the appearance and propagation of the grapevine fire blight and experiment conducted in its suppression 1952 year.]

mildew of the grape and experiments on its prevention introduced in 1952.] *Yugoslavia. Idrometeorološka Služba, Vesnik*, 2(2, 3):53-57; 85-90, April/June; July/Sept. 1953. 3 figs., 1 table. **DWB**—General characteristics of mildew caused by *Plasmopara viticola* are described and illustrated. Requirements of its activation are determined as follows: 1) temperature above 12°C (optimum 25°), 2) rain for at least 2 days with at least 10 mm rainfall, 3) the persistence of vine leaves at least 2/3 cm in size. A curve of average incubation time as a function of season is presented (according to MÜLLER). A research program conducted in Yugoslavia and comprising observation of the disease in experimental vineyards in conjunction with weather development is announced and preliminary qualitative results are reported for the period May-July 1952. *Subject Heading: 1. Plant diseases.—G.T.*

ENVIRONMENTAL INFLUENCES

See: Effective radiation from slopes (Kondrat'ev, Podol'skaia), 5.8-133; *Orographic influence on air motion* (Čadež), 5.8-170.

SYNOPTIC CLIMATOLOGY

5.8-262

551.589 551.509.34:551.576

Sanders, Frederick (*M.I.T.*), **Forecast study for Ikateq, Greenland**. U. S. Weather Bureau, 1945. 36 p. 26 figs., 17 charts. Carbon of typescript. Map used as title-page. **DWB**—One of the best examples of a local synoptic climatological or forecast study (for an airport located 36 mi northeast of Angmagssalik on the central east coast of Greenland). The data obtained during 1942-1945 have been analyzed for frequencies of ceilings, visibilities, surface winds, air masses, fronts, cyclones and anticyclones, stratus and fog, and these occurrences are related to synoptic patterns and upper air soundings. Examples given by means of numerous synoptic and comparative adiabatic charts and application to local forecasting problems are constantly referred to in the text. The section on stratus and fog (4 types are recognized in order of importance and 93 cases tabulated) occurrence and forecasting is exceptionally good from both a synoptic and dynamic point of view, only the reproduction of charts too poor. *Subject Headings: 1. Synoptic climatology 2. Local forecast studies 3. Stratus forecasting 4. Ikateq, East Greenland.—M.R.*

5.8-263

551.589.1 (438)

Gumiński, Romuald, **Materiały do poznania generzy i struktury klimatu Polski**. [Origin and structure of Poland's climate.] *Przegląd Geograficzny*, Warsaw, 24(3):3-26, 1952. 13 p., 5 tables. In Polish; Russian and English summaries p. 25-26. **DLC**—Proceeding from the premise that in the study of climate, one has first of all to focus attention on dynamic processes in the atmosphere which determine the weather and provide indications on background of the climate and its origin, the author analyzes: 1) different types of advection of air masses over Poland and the types of weather they bring (European monsoon and its effect on air temperature); 2) the transformation of air masses which regulates the climate (especially in summer) and 3) the effect caused by the orography of the terrain on the movement of fronts and disturbances in fronts and consequently, contrasts in the distribution of precipitation. Types of "macro weather" as: the "Western," "South-Eastern," "March," "low elevations" are examined separately. The article concludes with an analysis of annual curves of the various meteorological elements and of the air temperature in particular. Ample illustrated characteristic peculiarities of temperature curves recorded at the stations of Szczecin, Wrocław, Racibór and Olesko complete the paper. *Subject Headings: 1. Air mass climatology 2. Climate of Poland 3. Poland.—A.M.P.*

5.8-264

551.589.5(431/5)

Maede, Hans, **Die Hochdruckwetterlagen im Raume der südlichen Ostsee und des angrenzenden Flachlandes in klimatologischer Betrachtung**. [High pressure situations over the Southern Baltic and the bordering lowland from the climatological point of view.] *Zeitschrift für Meteorologie*, 7(5):129-146, May 1953. fig., 6 tables, 18 refs. **MH-BH**—High pressure situations over Mecklenburg and the Baltic Sea are subdivided into five types, namely

a high pressure center situation and four types of high pressure marginal situations in which high pressure weather prevails at the north, east, south or west margin of a high. The over frequency of high pressure weather situations and of the individual types is analyzed. Monthly and annual means of the daily maxima, minima and of the daily means of temperature, relative humidity, cloudiness and of scalar means of wind velocity calculated for Greifswald for the period 1925-1951 are presented and their relationship to the annual course of the high pressure types is discussed. Regional variations of the weather elements along the Mecklenburg coast of the Baltic are analyzed with the aid of selected weather types for the period 1947-1951 and the results are presented tabularly for these regions. The influence of the Baltic is expressed numerically. *Subject Headings:* 1. Anticyclones 2. Air mass climatology 3. Mecklenburg, Germany 4. Baltic Sea.—I.L.D.

MISCELLANEOUS APPLICATIONS

SOLAR INFLUENCES

See also: **Subsidiary layer in E region of ionosphere** (Naismith), 5.8-98; **Corpuscular eclipse in F2 layer . . .** (Sen Gupta, Mitra), 5.8-99; **Multiple stratification of F2 layer** (Skinner, others), 5.8-100; **Periodicity of winter temp., Stockholm, Helsinki (Simojoki), 5.8-141; Present drought, NE Brazil** (Sampaio Ferraz), 5.8-211.

5.8-265

551.590.21

†Hagihara, Y., **Researches in Japan on the solar and terrestrial relationship.** *International Council of Scientific Unions, Brussels, Commission for the Study of Solar and Terrestrial Relationships, Rome, Sept. 1952, Report No. 8:13-15, publ. 1953.* 31 refs. **DWB**—Summary of observation work in Japan on spectroheliograms, solar radio-emission, geomagnetic ionosphere, radio propagation, night-sky light and cosmic rays. A number of researches listed with references. *Subject Heading:* 1. Solar relations.—C.E.P.B.

5.8-266

551.590.21:621.396.8:551.590.21

Laffineur, M., **Corrélation entre certains phénomènes géophysiques et le rayonnement solaire sur 55 cm.** [Correlation between certain geophysical phenomena and solar radiation at 55 cm.] *International Council of Scientific Unions, Brussels, Commission for the Study of Solar and Terrestrial Relationships, Rome, Sept. 1952, Report, No. 8:19-20, publ. 1953.* 1 table. **DWB**—Disturbances on 55 cm occur as "points" or as bursts but not as storm noise. Radio electric phenomena accompanying chromospheric eruptions are tabulated under intense and weak points and intense and weak bursts (of 1-90 minutes). *Subject Headings:* 1. Solar influences 2. Solar radio radiation.—C.E.P.B.

5.8-267

551.590.21:551.510.53:551.590.21

Nicolet, M., **Actions de l'atmosphère terrestre sur les équilibres de photo-dissociation et de photo-ionisation par le rayonnement ultraviolet et X du soleil.** [The effect of the terrestrial atmosphere on the equilibrium of photo-dissociation and photo-ionization by ultraviolet and X rays.] *International Council of Scientific Unions, Brussels, Commission for the Study of Solar and Terrestrial Relationships, Rome, Sept. 1952, Report, No. 8:23-24, publ. 1953.* 2 eqs. **DWB**—Equations of equilibrium should include besides tidal effects advective dynamic effects and diffusion of gases in the gravity field. Above 160 km diffusion is so slow as to establish diffusive equilibrium. Advection is active at 100-140 km and O₂ follows vertical distribution of other elements. Hence relations between solar and terrestrial phenomena are more complex than the simple equilibrium due to photo-dissociation and photo-ionization. *Subject Headings:* 1. Solar influences 2. Stratosphere 3. Ionization.—C.E.P.B.

5.8-268

551.590.21

Vassy, A. and Vassy, E., **Mécanisme possible de l'action de l'activité solaire sur la basse atmosphère.** [Possible mechanism of the effect of solar activity on the lower atmosphere.] *International Council of Scientific Unions, Brussels, Commission for the Study of Solar and Terrestrial Relationships, Rome, Sept. 1952, Report, No. 8:30-32, publ. 1953.* 14 refs. **DWB**—Relation between solar activity and tropospheric phenomena cannot be due to heating.

ce, which exists in insufficient amount. Authors attribute it to absorption by oxygen and 2000 Å between 25 and 50 km. *Subject Heading: 1. Solar influences.—C.E.P.B.*

OPTICAL PHENOMENA

See also: Spatial integrating optical method of measuring vertical temp. and water vapor gradient in lowest atmos. (Brocks), 5.8-147.

5.8-269 551.593.55
Koomen, M. J.; Lock, C.; Packer, D. M.; Scolnik, R. and Hulburt, E. O. (Naval Res.), **Brightness of the twilight sky.** *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, (2):135-139, 1952. fig., table, 5 refs. **DLC**—Twilight sky brightness measurements made Maryland during 1951 are analyzed graphically and are compared with data from Sacramento Peak, N. M. (2800 m). The horizon brightness was about the same at the two places, but at 10° elevation the Sacramento Peak sky was $\frac{2}{3}$ to $\frac{1}{2}$ as bright as that in Maryland at the same elevation angle. A recording photoelectric photometer which sweeps the sky automatically with readings every $22\frac{1}{2}^\circ$ was used when skies were cloudless. *Subject Headings: 1. Twilight sky brightness measurements 2. Photometric twilight sky measurement 3. Photoelectric photometers 4. Maryland 5. Sacramento Peak, N. M.—M.R.*

5.8-270 551.593.653
Weigel, Werner, **Beobachtung leuchtender Nachtwolken auf dem Brocken.** [Observation noctilucent clouds from Brocken Mountain.] *Zeitschrift für Meteorologie*, 7(8):251, Aug. 1953. **MH-BH**—The observation was made 30 Jan. 1953 at 12 P.M. CET. Clouds had the appearance of long horizontal threads which sometimes were slightly bent. They gradually disappeared with a rhomboid like net and disappeared by 4 A.M. CET. *Subject Headings: 1. Noctilucent clouds 2. Brocken Mountain, Germany.—I.L.D.*

5.8-271 551.593.7:551.593.54
Dietze, Gerhard, **Die Polarisation des Himmelslichts in der getrübbten Atmosphäre. Methode zur Berechnung des Polarisationsgrades.** [Polarization of sky light in a hazy atmosphere. Model for calculating degree of polarization.] *Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen*, 4(28), 1954. 7 figs., 8 tables, 64 refs., 42 eqs. **DWB**—History since ARAGO (1809) is summarized. A practicable theory is developed for a model atmosphere with a lower hazy layer and an upper clear layer, and relations are established between degree of polarization and sky point, sun height, degree of obscuration, depth of hazy layer, scatter function and polarization of scattering particles, and pressure. An obscuration factor is defined which can be calculated from actinometric measurements with filters. The application of the model to the theory of TICHANOWSKI is tested and the theory is extended to a many-layered atmosphere. Tables are given for practical calculation. The extended theory can be used to analyze aerosols in free air. *Subject Headings: 1. Skylight polarization 2. Turbidity.—C.E.P.B.*

ELECTRICAL PHENOMENA

See also: Electric field regeneration in thunderstorms (Gunn), 5.8-3; Snow crystal growth theory (Marshall, Langbein), 5.8-6; Charge generation in thunderstorm theory (Mason), 5.8-7; Earth's electric field (Cornell Aeronautical Lab.), 5.8-40; Atmos. electricity measurement (Bossolasco, Meda), 5.8-64; Analog computer for solution of radio refractive index eq. (Johnson), 5.8-96; Determination of electron density in atmosphere (Kelso), 5.8-97; Electricity generation in thunderstorms (Mason), 5.8-120.

5.8-272 551.594.12:551.521.63:551.510.535
Pfister, W. (Geophysics Res. Directorate, Air Force Cambridge Res. Ctr.), **Note in Lindqvist's "An investigation of the ionizing effect in the E layer near sunrise."** *Journal of Geophysical Research*, 58(2):282, June 1953. **DWB**—Author questions assumption of LINDQUIST (item 4.9-255, Sept. 1953, *MAB*) that "electron production has a maximum at local time

and height where we first note the sudden decrease in virtual height near sunrise." The effect of twilight (scattering in atmosphere) is thought to be more important in this respect than mere absorption. Calculations are presented to support this contention. *Subject Headings:* 1. Twilight effects 2. Ionization 3. E layer. I. Lindquist, Rune.—M.R.

5.8-273

551.594.13:551.5

Milin, V. B. and Malakhov, S. G., *Provodimost' vozdukh i turbulentnoe peremeshivaniye v atmosfere*. [Air conductivity and turbulent mixing in the atmosphere.] *Akad. Nauk SSSR, Izvestiya, Ser. Geofizicheskaya*, No. 3:264-270, 1953. 6 figs., 14 refs., 19 DLC—Relationships between air conductivity and the turbulent mixing of the atmosphere are discussed, and a dependence between the relationships λ/K and the conditions of electric field are theoretically established. Characteristics of electric field are obtained from the relationship of differences in potential gradients according to observations taken at three heights. Results of observations concerning the correlation between the conductivity and the coefficient of turbulence K are presented and it is shown that they are in good agreement with the theoretical solution. *Subject Headings:* 1. Atmospheric conductivity 2. Turbulent mixing. N.T.Z.

5.8-274

551.594.13

Parkinson, W. D. and Weller, R. I. (Fordham Univ., N. Y.), *Atmospheric electric field over the ocean*. *Journal of Geophysical Research*, 58(2):270-272, June 1953. 1 fig., 10 refs. DWB—Measurements of positive conductivity, nuclei count and sea and rain water activity were made over the North Atlantic Ocean from a ship plying between New York and Liverpool and return. Bad weather prevented conductivity records on eastbound trip. Good records were obtained for 6 days on westbound trip. Mean positive conductivity including foggy periods was 1.22×10^{-4} esu. and mean nucleus count 844/cm² westbound and 449 east bound. A continuously recording Gerdien aspirator was used for conductivity and an Aitken pocket dust counter for nucleus count. β content of rain was high up to 10 km from shore but very low over deep ocean (5% of that over dry land) and none in sea. Ionization over the ocean is thought solely due to cosmic radiation. *Subject Headings:* 1. Atmospheric conductivity 2. Nuclei count 3. North Atlantic.—M.R.

5.8-275

551.594.13:551.5

Venkateshwaran, S. P.; Gupta, B. K. and Huddar, B. B., *Measurement of the electrical conductivity in the upper air by radiosonde*. *Indian Academy of Sciences, Proceedings*, 38(2):109-115, 1953. 3 figs., 14 refs. Abstracted from reprint. DWB—Attempts at measuring the positive conductivity of the upper atmosphere were made in Poona by means of a valve electrometer attached to a radiosonde, using two NR575 balloons with a total lift of 5000 g and an ascension rate of 16 km per hour. Two records made on Feb. 2 and March 4, 1953, are reproduced and the resulting values of electric conductivity from 150 mb (0.5 to 14.1 km) shown in a graph. The instruments, circuits, theory and principles of attempts along this line are described and illustrated. Factors affecting values of conductivity with height are: 1) cosmic ray intensity, 2) ion mobility, 3) ion destruction rate, 4) concentration of radioactive emanations from earth, 5) atmospheric pollution and 6) rate of ion formation. *Subject Headings:* 1. Electrical conductivity of air 2. Electrical conductivity measurements 3. Radiosonde conductivity soundings 4. Poona, India.—M.R.

5.8-276

551.594.14:551.513.2:551.5

†Herbst, W.; Neuwirth, R. and Philipp, K., *Betrachtungen über die Eignung radioaktiv atomtechnischer Aerosole als Markierungsmittel bei Arbeiten auf dem Gebiete der meteorologischen Strömungsforschung*. [Remarks on the suitability of artificial atomic radioactive aerosols as markers for work in atmospheric current investigations.] *Naturwissenschaften*, 41(7):156-160, April 1, 1954. 3 figs., 17 refs. DLC—Radioactive aerosols from the bomb explosion in Nevada on June 5, 1952, were brought down by rain at Helena, Montana, distant, on June 6-15. At Wittental, Germany (47°59'N, 7°57'E), twice normal rain was recorded on June 18-19. During intervening days there was a steady jet stream. Beginning June 6 at Helena, tracks on 500 mb charts ran 18,000 km across Atlantic and

Scandinavia, reaching Germany from the east on June 18. Tracks leaving Helena on June 8-13 did not reach S.W. Germany but a direct track from Helena on June 14 gave a distinct radiation peak at Wittental on 21st. The occurrences at Wittental are attributed to descent of air at a divergence line on the margin of the jet stream. Technique of measuring dual atomic products is discussed. *Subject Headings: 1. Radioactivity in the atmosphere 2. Jet stream 3. Atomic explosions.—C.E.P.B.*

5.8-277 551.594.14:551.577:539
Santomauro, L. and Cigna, A., *Prime misure sulla radioattività delle precipitazioni atmosferiche*. [First measurement of radioactivity of precipitation.] *Annali di Geofisica*, 6(3):381-387, July 1953. 2 figs., 16 refs. In Italian; English summary p. 387. **MH-BH**—During February 1951 to November 1952, the radioactivity of atmospheric precipitation was tested with a G-M counter. This activity was not constant: indeed it became greater for atomic experiments at Las Vegas, Eniwetok and Montebello Is. Therefore these facts are probably related. The activity increased about 8 days after Las Vegas experiments, 3 weeks after Eniwetok experiments and about three weeks after Montebello Is. experiments. Gamma and beta rays of the precipitation have been measured with G-M counter and the background of cosmic radiation was considered in drawing the diagrams. *Subject Headings: 1. Radioactivity of precipitation 2. Atomic explosions 3. Italy.—Authors' abstract.*

5.8-278 551.594.2:538.56:551.586
Reiter, Reinhold, *Gibt es einen direkten Kausalzusammenhang zwischen raschen elektromagnetischen oder elektromagnetischen Feldänderungen und biometeorologischen Reaktionen?* [Is there a direct connection between rapid electric or electromagnetic field changes and biometeorological reactions?] *Annalen der Meteorologie, Medizin-meteorologische Hefte*, No. 59, 1954. 12 figs., 2 tables, 114 refs. **MH-BH**—Author summarizes literature of possible physiological effects of short-wave radiation. He describes his data on: A) static electric field, its disturbances and vertical currents, B) short period impulses of 10-50 kHz and C) of 4-12 kHz, and quotes examples of associated weather and biological effects. The best correlations are between A and amputation aches (0.97), B and general weather complaints (0.88), C and brain contusion pains (0.88) and traffic accident statistics (0.85). He discusses possible causes of connections between these "indicators" and meteoropathological effects very fully and brings experimental evidence that the "indicators" are actually real causes, acting on cell membranes and organic colloids, e.g., in blood. Finally, he summarizes and extends work of FINDEISEN (*Bioklimatische Beiblätter*, 10:23, 1943) on conductivity of solution of As_2S_3 on disturbed and undisturbed days. *Subject Headings: 1. Electromagnetic field changes 2. Medical meteorology. I. Findeisen, W.—C.E.P.B.*

5.8-279 551.594.221:537.52
Sourdillon, M., *Note sur les "familles d'éclairs."* [Note on "families of lightning."] *Météorologie*, Paris, 4th Ser., No. 29:1-3, Jan./March 1953. 11 figs., 5 plates, ref. French, English and Spanish summaries p. 1. **MH-BH**—During any given lightning storm the strokes occur in certain patterns which would enable them to be classified as "families of lightning" of various types. Photographic evidence of these types obtained in 1951 in France is presented and the physical cause attributed to types of space charges under the cloud (after theory of D. J. MALAN). *Subject Headings: 1. Lightning types 2. Multiple lightning strokes 3. Brittany, France. I. Malan, D. J.—M.R.*

5.8-280 551.594.5:621.396.9
Burkhardt, K., *Radioechos am Nordlicht*. [Auroral radio echoes.] *Umschau*, 54(11):342, 1954. 2 refs. **DLC**—Brief article on discrete and diffuse echoes. Radar echoes from the height of the auroral layer as 110 km with a range of not more than 5 km. *Subject Headings: 1. Auroral radio echoes.—C.E.P.B.*

5.8-281 523.78:551.594.5
Ewing, Ann, *Sun eclipse spectacle*. *Science News Letter*, 65(14):218-219, April 3, 1954. **DLC**—Plans for scientific observations to be made during the solar eclipse of June 30, 1954 are outlined. They include day-time observation of auroras where the eclipse path

crosses the auroral zone, observation of zodiacal light, distance measurements between points on earth's surface, etc. There will be no eclipse so widely viewed until the year 2151. *Subject Headings: 1. Solar eclipses 2. Auroral observation.—G.T.*

5.8-282

551.594.

Bartha, Lajos jun., *A sarkifény gyakorisága Középeurópában*. [Frequency of aurora in Central Europe.] *Időjárás*, Budapest, 57(4):228-234, July/Aug. 1953. 7 figs., 2 tables, 9 refs., 2 eqs. Russian and French summaries p. 228. **MH-BH, DLC**—The data sources on auroras used in this study are: a) a list of auroral observations by H. FRITZ (1873-1911); b) yearly auroral summaries in the periodical *Sternenwelt* (1949-1951). From those sources the author analyzes the auroral observations made in middle latitudes (45-55°N) during the periods 1770-1871 and 1948-1950. Short (24-hour and 27-day) and long (1-year and 11-year) periodicities in Central Europe and in Hungary are investigated. The relation between the durations of the sunspot cycle (R) and the auroral cycle (Sp) is expressed as $Sp = \frac{R}{1.1}$.

Maps of the average frequency distribution of auroras in Central Europe and of the frequency distribution during sunspot maxima and minima are drawn. The author believes that these maps are an improvement over those presented by FRITZ. The increase of the frequency of auroral observations (Sg) with geographic latitude (φ) is found to follow the relation

$Sg = \frac{\varphi - 41.1}{4}$. *Subject Headings: 1. Auroral frequencies 2. Central Europe.—G.T.*

5.8-283

551.595.

Brunberg, Ernst-Åke and Rattner, Adam (*Royal Inst. of Tech., Stockholm*), *Experimental determination of electron orbits in the field of a magnetic dipole. Pt. II. Tellus*, Stockholm, 5(3):269-292, Aug. 1953. 24 figs., 24 diagrams. **MH-BH**—Diagrams of the asymptotic direction and momentum (eV/c) of cosmic ray or electron particles entering a field of a magnetic dipole are presented for latitudes 50° to 0° [those for 90°-60° were published in Pt. I (see item 5.8-282, March 1954, *MAB*)]. Four complex nomograms are presented for each latitude: ψ_E in the $E-W$ plane, ϕ_N in the $N-S$ plane, ψ_E in the $E-W$ plane, and ϕ_N in the $E-W$ plane where ϕ_N is North latitude angle and ψ_E is longitude angle reckoned eastwards from the meridional plane through the point of incidence. Curves are for particles arriving from zenith, 8°, 16°, 24° . . . 80°N and 8°, 16°, 24° . . . 80°S of zenith. *Subject Headings: 1. Dipole fields 2. Electron orbits 3. Nomograms.—M.R.*

5.8-284

551.594.7:621.396.029.6:551.595.7

Koch, Bernhard, *Réflexion de micro-ondes par des phénomènes de détonation*. [Reflection of microwaves by explosion phenomena.] *Académie des Sciences, Paris, Comptes Rendus*, 236(7):661-663, Feb. 16, 1953. 5 refs. **DWB**—Using the Doppler-Fizeau effect it is possible to detect the echoes from an electromagnetic wave from the explosive wave front. By using this method it is possible to measure the speed of the explosive wave and the ionization of the gases in the explosion. A table gives seven experimental values of speeds thus determined, showing an average of 7994 ± 47 m/sec or $\pm 0.6\%$. *Subject Headings: 1. Microwave reflection 2. Explosion waves.—M.R.*

ACOUSTICAL PHENOMENA

See also: *Microwave reflection by explosion phenomena* (Koch), 5.8-284.

5.8-285

551.596.9:551.597.9

Tatarskii, V. I., *O fluktuatsiakh fazy zvuka v turbulentnoi srede*. [Fluctuations of sound phase in a turbulent medium.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizika*, No. 3:252-258, 1953. 5 figs., 2 refs., 40 eqs. **DLC**—The fluctuations of the sound phase are carried out in limits of geometric acoustics. The mean square of the fluctuations of the phase difference is calculated with variable relationship between the base and the distance covered by sound in a turbulent medium. *Subject Headings: 1. Acoustical phenomena 2. Turbulence effects.—N.T.Z.*

PART II. ANNOTATED BIBLIOGRAPHY ON MEDIUM SCALE VERTICAL MOTION IN THE ATMOSPHERE

By: Mollie P. Kramer

INTRODUCTORY NOTE

For the purposes of this bibliography, the term "medium scale vertical motion in the atmosphere" is chosen to specify motion on a scale larger than that involved in turbulent diffusion and exchange and smaller than that associated with air mass lifting, cyclogenesis and the general circulation. The field by definition is broad and not clearly delineated, and cuts across the more specific subjects of mountain meteorology, thermals, turbulence and convective clouds including thunderstorms. The references below can therefore represent but a very small sample of the pertinent literature. Some effort has been made to select such studies as show the direct influence of vertical motion on flight, but a few purely theoretical works have also been included (e.g. 5H-98, -101, -104, -116). For further references to mountain meteorology, thunderstorms and orographic turbulence see the bibliographies dealing with those subjects in the Aug. 1950, Nov. 1951 and Nov. 1952 issues of *MAB*. Other pertinent items include numbers 6-66, 2.6-92, 2G-249, 3.10-206, 4B-2, 4.8-84, and 5.5-152 in volumes 1-5, *MAB* as well as the numerous references cited in the bibliography of item 5H-125 below.

The asterisk (*) denotes data, the dagger (†), references and the symbol (§) synoptic material.

SUBJECT OUTLINE

- Downdrafts, 5H-19, -20, -23 to -26, -29, -33, -37, -38, -44, -45, -49, -55, -57, -64, -70, -75, -76, -85, -86, -89, -90, -92, -93, -97, -103, -107, -115, -117, -119
- Updrafts, 5H-7, -20 to -26, -28, -29, -33, -38, -39, -41, -44 to -46, -50, -52, -53, -57, -58, -64, -67, -69, -72, -75, -78, -79, -81, -85, -86, -90, -97, -100, -109, -115, -119, -120
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- Mountain top vortices, 5H-16, -40
- Lee troughs and eddies, 5H-1, -5, -7, -43, -44, -58, -59, -83, -108
- Orographic turbulence, 5H-2, -16, -17, -23, -28, -29, -54, -61, -75
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 - Thermodynamics of downdrafts, 5H-22, -81, -120
 - Atmospheric convection, 5H-3, -5, -30, -47
- Observational Media
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BIBLIOGRAPHY ON MEDIUM SCALE VERTICAL MOTION IN THE ATMOSPHERE

1925

5H-1

- Ficker, Heinrich von, *Bemerkungen über den Verlauf von Stromlinien im Gebirge*. [Referred to on the course of streamlines in mountains.] Berlin. Preussisches Meteorologisches Institut *öffentliche Mitteilungen*, No. 327:31-46, 1925. 11 figs. Abstracted from reprint. DLC—An investigation with flow diagrams, based on observations with a manned balloon, 1910-1914, at Innsbruck. A difficulty is that the balloon rises and sinks less than do the streamlines. Flow is then described

551.8

n winds and with NW winds with calm in the valleys. Some remarkable examples of lee eddies illustrated. (*Same item as 2K-70, Nov. 1951, MAB.*) *Subject Headings:* 1. Air flow over mountains 2. Lee eddies 3. Streamlines 4. Innsbruck, Austria.—C.E.P.B.

1926

5H-2

551.551:551.588.2

Koschmieder, Harald, *Die Luftströmungen um Berghindernisse in der freien Atmosphäre.* [Air currents over mountain obstacles in the free atmosphere.] *Beiträge zur Geophysik*, 15 (3):285-1926. 12 figs., 15 refs. **DLC**—Theoretical discussion of two- and three-dimensional turbulence air flow over and around hills or mountains. Measuring techniques described and results of measurements made by means of free or pilot balloons, kites and surface observations integrated with theoretical formulas. Effect of lapse rate, wind speed, etc., discussed. Lee effects nicely illustrated. (*Same item as 3K-23, Nov. 1952, MAB.*) *Subject Headings:* 1. Orographic turbulence measurement 3. Lee effects.—M.R.

1929

5H-3

551.511 (02):551.558

Humphreys, William Jackson, *Physics of the air.* 2nd ed. McGraw-Hill Book Co., N. Y., 1929. 654 p. figs., tables, refs. **DLC**—For discussion of vertical convection in the atmosphere, Chap. VII; for cumulus convection and mountain convections, Chap. IX; for winds adverse to motion, Chap. XIII; and for violent motions in cumulus clouds associated with thunderstorms, Chap. XVII. (*Same item as 2D-7 and 2G-105, April and July 1951, MAB.*) *Subject Headings:* 1. Atmosphere physics 2. Textbooks 3. Vertical motion.—M.P.K.

5H-4

551.551:551.507.321.4

Peppler, Albert, *Über starke Vertikalböen in der freien Atmosphäre.* [On strong vertical motions in the free atmosphere.] *Beiträge zur Physik der freien Atmosphäre*, 16:115-130, 1929. 6 figs., 1 table. **DWB**—The possible means of measuring vertical motion associated with turbulence or gustiness are outlined with emphasis on the use of the captive kite balloon. Height of the layer at which strong vertical gusts are found and associated wind and temperature conditions are discussed. Table I case histories of 31 gust occurrences are listed with information regarding height, wind direction (over, in, and under the layer), temperature gradient in the layer, cloudiness and any unusual characteristics of each case. (*Same item as 3K-27, Nov. 1952, MAB.*) *Subject Headings:* 1. Clear air turbulence 2. Gustiness 3. Vertical motion.—M.P.K.

5H-5

551.551:551.558.21

Raethjen, Paul, *Zur Vertikalbewegung im atmosphärischen Kontinuum.* 1. Isolierte Luftströmungen im atmosphärischen Kontinuum. 2. Isolierte Vertikalbewegung und überadiabatische Temperaturgradienten. 3. Die Wirbelstärke im zweidimensionalen stationären Stromfeld. 4. Stationäre Stromfelder am Berghindernis. [On vertical motion in the atmosphere. 1. Isolated air masses in the atmosphere. 2. Isolated vertical motion and superadiabatic temperature gradients. Eddy size in a two-dimensional stationary field of flow. 4. Stationary field of flow in the vicinity of mountains.] *Meteorologische Zeitschrift*, 46:292-300; 329-337; 383-393; 420-435, 1929. figs., 1 table. **DLC**—A series of theoretical articles in which the case of isolated warm air parcels rising in "chimneys" through colder air is first considered and then the equations for eddies in air flow over mountains are derived. *Subject Headings:* 1. Air flow over mountains 2. Thermals 3. Vertical motion.—M.P.K.

1930

5H-6

551.558.21:778.5

Abe, Masanao, *Local air current of Mt. Fuji, as observed by the motion of cloud by the aid of a cinematograph.* *Geophysical Magazine*, Tokyo, 3:45-58, 1930. 9 figs., 3 plates, 2 tables. **DLC**—In addition to quick-motion cinema films, stereoscopic photos were made by 2 cameras 500 m apart. Positions and motions of 6 clouds on Oct. 6, 1928 are set out diagrammatically and heights (1.5-3 km) and speeds (3-32 m/sec) tabulated. Wind currents were also studied by means of a model Mt. Fuji in a wind tunnel, giving some interesting wave motions. The plates show a stereoscopic view, experiments with model, and strips of cinema films. (*Same item as 2K-101 Nov. 1951 MAB.*) *Subject Headings:* 1. Mountain meteorology 2. Winds 3. Air flow over mountains 4. Mt. Fuji, Japan.—C.E.P.B.

1933

5H-7

551.558.21

*Field, J. H. and Warden, R., *A survey of the air currents in the Bay of Gibraltar, 1929-30. Gibraltar Britain.* *Meteorological Office, Geophysical Memoirs*, 7 (59), 1933. 30 p. 5 tables, 31 plates,

append. **DLC**—Report of an extensive investigation aimed at determining the degree of involved in flying or landing in the vicinity of the Rock of Gibraltar with winds of stated direction and strength. Preliminary study was carried out with a model in a wind tunnel using a grid of two-inch silk fibres to indicate microvariations of wind direction and violence and long streamer of fine wool fibres to show streamline shapes. Field work then consisted of the theodolite tracking of 138 pilot balloons and numerous observations of wind yaw, pitch and strength taken with a specially designed kite-borne instrument. Combined investigations revealed turbulent winds (sea level to 5000 ft) to leeward of the Rock, large permanent vertical vortices which migrate according to wind direction, and downdrafts which could reach as much as 1500 ft/min (see table II, p. 16). *Subject Headings: 1. Downdrafts 2. Orographic turbulence 3. Wind tunnel experiments 4. Gibraltar M.P.K.*

5H-8

551.558.21:55

Georgii, Walter, *Influence des montagnes sur le vent (lère et 2ème communications.)* [Influence of mountains on the wind. (1st and 2nd communications.)] *La Météorologie*, 9:105-1933. 4 figs., tables. Also: *Études sur le vent orographique*. [Studies on orographic winds.] *Ibid.*, p. 122-127. And: *Courant ascendant et hauteurs d'influence*. [Ascending current and heights of influence.] *Ibid.*, p. 133-137. *Limite supérieure des courants déformés par les obstacles*. [Upper limit of flow deformed by obstacles.] *Ibid.*, p. 156-157. **DWB**—Soundings by kites and balloons show that the influence of mountains on winds is about $0.29 \times$ height of mountain, varying with wind direction and temperature lapse. The second paper shows the horizontal range of influence of a mountain in relation to its height. If slope of mountain from crest to foot is α° and angle of range of influence of β° , then generally $\beta = \lambda/2$. (Same item as 2K-140, Nov. 1952, MAB.) *Subject Heading: 1. Air flow over mountains.—C.E.P.B.*

1934

5H-9

551.524.4:629.135.1 551.554:629.1

Georgii, W., *Thermischer Segelflug*. [Gliding in convection currents.] *Luftfahrtforschung*, 2(5):117/121, Oct. 25, 1934. Translated as: *U. S. National Advisory Committee for Aeronautics Technical Memorandums*, No. 761, Jan. 1935. 4 figs. **DWB**—A discussion of the possibilities of gliding in wind, evening, ocean and height thermals as well as in the better known insolation thermals. Figures show diagrammatically the various types of thermals and the vertical velocities experienced by sailplanes in actual flights. *Subject Headings: 1. Thermals 2. Gliding 3. Vertical motion I. J. Vanier, (trans.)—M.P.K.*

5H-10

551.551:60

Thompson, F. L., Peck, W. C. and Beard, A. P., *Air conditions close to the ground and the effect on airplane landings*. *U. S. NACA, Report*, No. 489, 1934. 15 p. 27 figs., 2 tables, 7 refs. **DWB**—Measurements of horizontal and vertical wind variations up to about 50 ft above the ground lead to the conclusion that unchecked glide landings in gusty air were unduly hazardous. (Same item as 3K-40, Nov. 1952, MAB.) *Subject Headings: 1. Turbulence in the frictional layer 2. Aeronautical meteorology 3. Gustiness.—M.P.K.*

1935

5H-11

551.551:60

Baldir, A., *Les perturbations dues au relief terrestre et l'aviation*. [Flight and disturbances due to topography.] Paris, Société Météorologique de France, 1935. 46 p. 12 figs., tables. Also in: *La Météorologie*, 11:267-312, June 1935. **DWB**—Winds, gustiness, vertical currents, and turbulence encountered over plains, forests, marshes, hills, mountains, valleys, oceanic transitional areas are discussed with regard to their effect on flight. (Same item as 3K-41, Nov. 1952, MAB.) *Subject Headings: 1. Turbulence in the frictional layer 2. Orographic turbulence 3. Aeronautical meteorology.—M.P.K.*

1936

5H-12

551.551:60

Andrews, R. T., *Strong vertical current*. *Meteorological Magazine*, London, 71(847):161-165, Aug. 1936. table. **DLC**—Brief account of a pilot's ascent at Abbotsinch in Sept. during which a vertical current of 13 ft/sec was observed at 12,000 ft. (Same item as 3K-45, Nov. 1952, MAB.) *Subject Headings: 1. Clear air turbulence 2. Vertical currents 3. Abbotsinch, Scotland.—M.P.K.*

5H-13

551.551:60

*Fisher, H. R., *Accelerations of airplanes in vertical air currents*. Pt. II. The interpretation of accelerometer records. Great Britain. Aeronautical Research Committee, Technical Report No. 17, 1936.

the year 1934-1935, v. II:904-919, publ. 1936. 25 figs., 8 eqs., 4 refs., tables, appends. *Reports and Memoranda* No. 1629. **DWB**—Accelerometer records indicate "well-defined local and extended vertical currents in cumulus clouds reaching their maxima in from 50 to 100 ft and usually accompanied by small boundary eddies. Independent horizontal eddies of from 100 to 200 ft diameter also appear to be frequent." *Subject Headings: 1. Vertical currents 2. Cumulus clouds.*

1938

5H-14

551.5:551.43

Ives, Roland L., **Weather phenomena of the Colorado Rockies.** *Franklin Institute, Journal*, 26(6):691-755, Dec. 1938. 20 figs., 14 refs. **DLC**—A general summary of winter and summer storm types and their effects on precipitation, Chinook winds, topographically-confined local convectional storms and numerous barometric, electrical and optical phenomena typical of the region. Pages 746-748 and figure 20 are descriptive of the "backdraft" phenomenon and associated violent barometric fluctuations observed when a high wind blows across the rim of a high leeward-facing cirque sucking out the air aspirator-fashion and depressing the barometer as low as 14 inches. The "backdraft" which rushes in to replace the sucked-out air sometimes raises the barometer to 22 inches in a few minutes. *Subject Headings: 1. Mountain meteorology 2. Altimeter errors 3. Rocky Mountains, Colorado.—M.P.K.*

5H-15

551.558.21

†Kuettner, Joachim, **Moazagotl und Föhnwelle.** [Moazagotl and föhn wave.] *Beiträge zur Physik der freien Atmosphäre*, 25(2):79-114, 1938. 43 figs., refs., photos. **DLC**—A comprehensive and adequately illustrated account of standing waves, Moazagotl clouds, vortices and föhn waves (in cyclonic and anticyclonic conditions) to leeward of mountain ranges and the air flow associated with the various phenomena. Examples cited from the Riesen Gebirge, Alps, Blue Ridge, Greenland, Himalayas, Mt. Aetna and Mt. Fuji. *Subject Headings: 1. Air flow over mountains 2. Mountain meteorology 3. Föhn effects 4. Moazagotl clouds.—M.P.K.*

1939

5H-16

551.551:551.511(02)

†Lettau, Heinz, **Atmosphärische Turbulenz.** [Atmospheric turbulence.] Leipzig, Akademische Verlagsgesellschaft, 1939. 283 p. 59 figs., 25 tables, 246 refs., numerous eqs. Lithoprinted by Edwards Brothers, Inc., Ann Arbor, Mich., 1944. **DLC**—This classic text comprises the most thorough and systematic treatment of turbulence ever attempted. On p. 101, the author discusses the possibility that behind mountain ridges vortices can be formed which break away periodically as in a von Kármán street. Discussion based mainly upon an interesting barogram obtained by the Norwegian Weather Bureau at the small North Atlantic island of Jan Mayen where oscillations were recorded on the barograph to leeward of a roughly half-cylindrical mountain wall. Formula for period of oscillations given. (Same item as 3K-52, Nov. 1952, MAB.) *Subject Headings: 1. Turbulence theory 2. Air flow over mountains 3. Textbooks.—C.E.P.B.*

5H-17

551.576.11:551.43

Reinhardt, H., **Ein Beitrag zum Problem der hohen Hinderniswolken.** [A contribution to the problem of high obstacle clouds.] *Beiträge zur Physik der freien Atmosphäre*, 26(1):23-37, 1939. 7 figs., 21 refs. **DLC**—Information about the high obstacle clouds and low turbulence clouds on the lee of the Riesen Gebirge in föhn weather is set out, with M.S.L. isobars and 50 mb isohypses, upper air ascents and anemograms. Two types of lee waves are distinguished, an upper system and also travelling whirls with horizontal axes in the turbulent zone. (Same item as 3K-224, Nov. 1952, MAB.) *Subject Headings: 1. Orographic turbulence 2. Mountain meteorology 3. Cloud structure 4. Riesen Gebirge, Germany.—C.E.P.B.*

1941

5H-18

551.5:551.43

Abe, Masanao, **Mountain clouds, their forms and connected air current.** *Japan. Central Meteorological Observatory, Bulletin*, 7(3):121, 1941. Also fig. 15, Plate IV. **DLC**—An example of pressure depression due to a mountain-top vortex can be seen in ABE's photograph of a cloud around Mt. Fuji, which he titled "a rotary cloud with inclined axis of rotation." The rotating motion was of a twisting nature and the cloud shape resembled a screw. Unless a strong local source of moist air existed, such a cloud formation could have indicated an altimeter error in its vicinity of over 1000 ft. *Subject Headings: 1. Mountain top vortices 2. Altimeter errors 3. Mt. Fuji, Japan.*

1942

5H-19

551.576.11:551.558.

Eliassen, Arnt, **On the motion of air over a mountain ridge.** *Meteorologische Annalen*, 1(5):10, 113, 1942. 5 figs., 16 eqs. **DLC**—Author sets out the equations of permanent two-dimensional flow with horizontal asymptotes in a stable atmosphere, but concludes that the necessary assumption of nearly rectilinear motion is rarely fulfilled. He derives the vertical displacement at different levels and determines that the greatest upward displacement occurs at a level which is one-half the vertical wave-height above the frictional layer. The formation and height of Moazagotl cloud are discussed. (*Same item as 2K-236*, Nov. 1951, *MAB.*) *Subject Headings: 1. Air flow over mountains 2. Moazagotl clouds 3. Riesen Gebirge, Germany.—M.P.K.*

5H-20

551.558.

†Krug-Pieklsticker, Ursel, **Beobachtungen der hohen Föhnwelle an den Ostalpen.** [Observations of the high föhn wave above the East Alps.] *Beiträge zur Physik der freien Atmosphäre*, 27:140-164, 1942. 28 figs., 19 refs. Review by V. Conrad in: *American Meteorological Society Bulletin*, 25:70, Feb. 1944. **DLC**—In the Riesen Gebirge (ca. 5300 ft high) the air flowing above the layer of the cyclonic föhn shows vertical movements reverse to the normal föhn current. On the lee side air ascends with rather great velocity frequently in a number of oscillations one after the other. The associated billow clouds, called high föhn waves in this paper and illustrated with photographs, were studied by motor and gliding flights. Vertical motion of air in the middle and upper troposphere found opposite to that in the bottom layers; i.e., on the lee side, upwards above and downwards below ca. 13,000 ft. *Subject Headings: 1. Föhn waves 2. Updrafts 3. Downdrafts 4. Air flow over mountains 5. Riesen Gebirge, Germany. I. Conrad, V.*

1943

5H-21

551.576:651.558.

Harrison, Louis P., **Turbulence associated with miscellaneous types of clouds.** *Soaring*, Dallas, Texas, 7(3/4):7-11, March/April 1943. illus., 2 refs., photo. **DLC**—A discussion of the turbulence resulting from instability caused by steepening of the lapse rate accompanying liberation of the latent heat of fusion when ice crystals fall into a lower portion of the cloud or another cloud constituted of supercooled water droplets. Brief mention is made of the strong downdrafts associated with the sudden release of precipitation when a cumulonimbus cloud overshoots the equilibrium level. For further references to downdrafts, special winds and various types of atmospheric turbulence, see articles by HARRISON in volumes 6, 1942 and 7, 1943 of *Soaring*. *Subject Headings: 1. Turbulence in clouds 2. Downdrafts.—M.P.K.*

5H-22

551.515.4:551.558.

Kaplan, Henry G., **On the mechanism of thunderstorm downdrafts.** *American Meteorological Society, Bulletin*, 24:54-59, Feb. 1943. fig., 5 refs. **DWB**—The cooling processes that maintain a downdraft in a thunderstorm are divided into several factors. Most important is heat of vaporization of the heavy precipitation falling with or through the descending units; another is the specific heat of the quantities of water and ice accompanying or passing through each unit of descending air; another is the melting of ice hydrometeors, etc. Further characteristics of downdraft mechanism also noted. (*Same item as H-125*, Aug. 1950, *MAB.*) *Subject Headings: 1. Thunderstorm dynamics 2. Downdrafts.—H.P.K.*

1944

5H-23

551.5(02):551.558.

Byers, Horace R., **General meteorology.** 1st ed. N. Y., McGraw Hill, 1944. 645 p. figs., tables, refs. **DWB**—Contains (p. 564-568) a section on vertical currents, their strength, their velocities of hailstones (table given), thunderstorm up- and downdrafts, etc. Vertical convection is treated on p. 11-12 and its relation to turbulence on p. 589-590. (*Same item as D-49 and 4B-49*, April 1950 and Feb. 1953, *MAB.*) *Subject Headings: 1. Vertical currents 2. Hailstone terminal velocities 3. Thunderstorm turbulence.—K.M.*

1945

5H-24

551.5(04) 551.551:621.558.

Haynes, Benarthur C., **Civil air patrol cadet—meteorological lecture series.** U. S. Weather Bureau, 1945. 59 p. **DWB**—Pages 1-5 of lecture three contain vivid descriptions of violent downdrafts and downdrafts encountered by a commercial airlines pilot and a glider pilot in overcast thunderstorm conditions. Mention also made of low level eddy currents which present hazards to landing aircraft. (*Same item as 3K-71* in Nov. 1952.) *Subject Headings: 1. Updrafts 2. Downdrafts 3. Thunderstorm dynamics 4. Turbulence in the frictional layer.—M.P.K.*

5H-25

551.555.4

†Manley, Gordon, *The Helm wind of Crossfell, 1937-1939*. Royal Meteorological Society, *Quarterly Journal*, 71(309-310):197-219, July-Oct. 1945. 12 figs., refs. DWB—Based on two years' investigation of the Helm wind of the Northern Pennines, this study includes photographs showing clouds formed in the lee wave, compares the phenomenon to conditions in the lee of the Rock of Gibraltar (5H-7 above) and the Riesen Gebirge (5H-17, 19, 20 above) and mentions the vigorous downward and upward currents which may be dangerous to aircraft." *Subject Headings*: 1. Helm wind 2. Lee waves 3. Updrafts 4. Downdrafts 5. Northern Pennines, England.—M.P.K.

5H-26

551.558.1

Moskovitz, A. I., *Characteristics of vertical drafts and associated vertical-gust velocities within convective-type clouds*. U. S. NACA, *Wartime Report*, No. L-554, Jan. 1945. 9 p. 2 figs., table, refs. DLC—The intensity and extent of up- or downdrafts and associated gusts in convective clouds was measured with an airplane at various altitudes up to 30,600 ft. Results shown in charts and table indicate that maximum true gust velocities are on the average equal to the velocities of the vertical drafts (correlation coefficient .95 from barograph records and .99 from motion picture records). The extent of single up- or downdrafts was from 3 to 45% of the cloud width. (Same item as 3K-72, Nov. 1952, MAB.) *Subject Headings*: 1. Convective clouds 2. Gust velocities 3. Updrafts 4. Downdrafts.—M.R.

1946

5H-27

551.551

Pinus, N. Z., *K voprosu ob eksperimental'nom issledovanii poryvistosti vozdushnykh potokov v svobodnoi atmosfere*. [On the question of experimental investigation of gusty air currents in the free atmosphere.] *Meteorologiya i Gidrologiya*, 4:14-21, 1946. 5 figs., 4 tables, bibliog. DWB—Results of visual and instrumental observations on turbulence of air currents on an airplane, given in tabular form with ample notes made on individual flights. Flights were made at Moscow between March 1934 and April 1945, with aerometeorograph for determining lapse rates and accelerometer for determining vertical velocities. (Same item as 3K-84, Nov. 1952, MAB.) *Subject Headings*: 1. Vertical motion 2. Clear air turbulence 3. Moscow, U.S.S.R.—M.R.

1947

5H-28

551.551:551.509.5:629.13(788)

Horning, Forrest E., *Flying weather over the Colorado Mountains*. Denver, Colorado, U. S. Weather Bureau, [1947]. 8 p. Typescript. DWB—The areas of greatest turbulence encountered by pilots flying along airways in Colorado are outlined, and the orographic and upper air or synoptic conditions most favorable to light or severe turbulence specified. Hints for pilots or forecasters who wish to anticipate areas of turbulence are given. Two types: 1) convective cloud turbulence and 2) lee or downdraft turbulence may be serious for light planes flying low over mountains. The former type can be expected when cumulus clouds are observed over the peaks, and the latter when cirriforms at Denver or Grand Junction, Colorado, indicate >35 mph between 9 and 14 thousand ft. (Same item as 3K-92, Nov. 1952, MAB. See also 3K-111, Nov. 1952, MAB.) *Subject Headings*: 1. Orographic turbulence 2. Downdrafts 3. Turbulence forecasting 4. Colorado. I. U. S. Weather Bureau.—M.R.

5H-29

551.5:797.5

Slater, Alan E., *Meteorology*. (In: Douglas, Ann C., *Gliding and advanced soaring*. London, John Murray, 1947. Chap. 5, p. 111-172.) DLC—Basic information on wind, temperature, clouds and weather of importance to soaring pilots. Emphasis laid on turbulence, orographic effects, up- and downdrafts, thermals, convective clouds, wind shadows, stability, standing waves and similar phenomena. *Subject Headings*: 1. Gliding 2. Aeronautical meteorology 3. Textbooks.—M.P.K.

5H-30

551.554:551.46

Woodcock, Alfred H. and Wyman, Jeffries, *Convective motion in air over the sea*. New York Academy of Science, *Annals*, 48(8):749-776, Sept. 15, 1947. 8 figs., table, 9 plates, refs. Discussion by Bernhard Haurwitz, p. 767. DLC—The classic experiments of BÉNARD, in which he observed regime of polygonal convection cells set up in a thin layer of liquid heated from the bottom until a certain critical temperature gradient was reached, are described and the counterparts of such cells in the atmosphere pointed out. The main part of the paper consists of diagrams, photographs and explanations of the convection patterns displayed by smoke screens laid down at sea. Systematic dark and light bands on the sea surface lying parallel to the wind were explained tentatively as evidence of either longitudinal roll vortices in the air or a system of internal waves in the mixed

surface layer. (Same item as 5A-151, Jan. 1954, MAB.) *Subject Headings:* 1. Convection over the sea 2. Marine meteorology. I. Haurwitz, Bernhard.—*Authors' abstract.*

1948

5H-31

551.551:551.515

Aanensen, C. J. M., Turbulence in clear air near a warm-front surface. *Meteorological Magazine*, London, 77(15):209-210, 1948. DWB—An account of an unusual occurrence of turbulence at the 500 mb level (18,000 ft) giving exact location with respect to warm front. (Same item as 3K-102, Nov. 1952, MAB.) *Subject Heading:* 1. Clear air turbulence.—M.P.K.

5H-32

551.551:629.

Briegleb, William C., Wind shifts and stalls. *Aviation Week*, New York, 48(17):33, May, 1948. DLC—A letter to the editor telling of the author's experiences with wind shifts and gusts at low altitudes, particularly those associated with thermals. (Same item as 3K-105, Nov. 1952, MAB.) *Subject Headings:* 1. Turbulence in the frictional layer 2. Aeronautical meteorology 3. Gustiness 4. Thermals.—M.P.K.

5H-33

551.511

Byers, Horace R. and Braham, Roscoe R., Jr., Thunderstorm structure and circulation. *Journal of Meteorology*, 5(3):71-86, June 1948. 23 figs., 16 refs. DWB—Data from Thunderstorm Project observations in Florida, derived mainly from airplane traverses through thunderstorms, are analyzed to obtain a description of thunderstorm structure and circulation. The independent convective cells of which thunderstorms consist are comprehensively discussed. An example of a thunderstorm with typical structure and vertical currents is given. Figs. 15-18 illustrate the up- and downdraft conditions in time sequence as encountered by reconnaissance airplanes. When updraft lapse rate becomes near that of the environment due to entrainment, it becomes very easy for falling rain to "trigger" a downdraft (in the previous updraft area) that reaches and spreads out over the surface as the cold core of the rain area. (Same item as H-176, Aug. 1950, MAB. For further information on the Thunderstorm Project, see item 6-46, June 1950, MAB.) *Subject Headings:* 1. Thunderstorm dynamics 2. Downdrafts 3. Updrafts 4. Thunderstorm Project 5. Florida.—H.P.K., M.P.K.

5H-34

551.558.1:799

Georgii, Walter, Les bases météorologiques du vol à voile. [Meteorological bases of gliding.] Paris, Service de Documentation et d'Information Technique de l'Aéronautique, 1948. 78 p. 16 figs. Trans. by Edward L. Corton, Jr. as U. S. Naval Ordnance Test Station, Inyokern, TM-100, Aug. 1952. DWB—An excellent monograph on the hydrodynamic and meteorological factors affecting soaring including orographic effects, thermals, inversions, vertical currents, standing waves and clear air turbulence. (Same item as 3K-109, Nov. 1952, MAB.) *Subject Headings:* 1. Clear air turbulence 2. Gliding 3. Vertical currents 4. Orographic turbulence. I. France. Service de Documentation et d'Information Technique de l'Aéronautique II. Corton, Edward L., Jr. (trans.). M.R.

5H-35

551.511:551.558

Queney, Paul (Univ. of Paris, France), The problem of air flow over mountains: A summary of theoretical studies. *American Meteorological Society, Bulletin*, 29(1):16-26, Jan. 1948. 5 figs., 16 refs., 16 eqs. MH-BH—The theoretical researches on the problem of the disturbance of atmospheric current flowing over a mountain range, carried on during the last ten years, prove that most of the characteristic observed features can be explained, to a very large extent, by the dynamical theory of internal, small adiabatic perturbations in a stratified rotating atmosphere. Typical problems such as the flow of an unlimited uniform current with uniform stratification (1) a sinusoidal ground profile, (2) a solitary mountain range and (3) a plateau with two parallel edges are considered in some detail. Theory then applied to an arbitrary given mountain profile taking into account the effect of atmospheric discontinuities and the effects of wind shear and horizontal temperature gradient. (Same item as 5D-145, April 1954, MAB.) *Subject Headings:* 1. Air flow over mountains 2. Dynamics of the atmosphere.—M.P.K.

5H-36

551.558

Raspet, August, The air flow over an extended ridge. U. S. Office of Naval Research, Contract N70nr-400, Task Order 1, Research Report No. 2, Nov. 1948. 9 p. 10 figs., refs. DWB—Study aimed at correlating experimentally determined atmospheric flow fields against available theory for air flow over natural obstacles. Results show that: a) from the differential equation of meteorological flow of Raethjen, it was not possible to define the type of flow from the parameters included in the theory; b) for the wave-like airflows, wave lengths computed on the basis of

vity waves were found to agree with experimental results in the level 1 to 4 km only; c) the theories of AYRA and QUENEY predict waves to the lee of the obstacle but in the exploration waves were also found to windward of the ridge. Theories of RINGLEB and SEKERA appear worthy of experimental study. (For information on "The sailplane as a meteorological probe" see Research Report No. 1, MAB, 14, 1948, abstracted as item 2-24, Feb. 1950, MAB.) Subject Headings: 1. Air flow over mountains 2. Aerodynamics 3. Lee waves 4. Gliding. I. Contract N7onr-400, Task Order 1. U. S. Office of Naval Research.—From author's summary.

5H-37

551.551:629.13

Treloar, H. M., Note on abnormal vertical currents, measured at Melbourne in relation to vision in aeroplane design against gust effects. *Weather Development and Research Bulletin*, Melbourne, No. 11:37-40, Dec. 1948. tables. DWB—Records of abnormal vertical currents obtained through observations of pilot balloons at Melbourne are compared with standard gust intensities anticipated in air worthiness tests of aircraft. A case of a violent 31 m/sec updraft at a Cund base is reported. (Same item as 3K-122, Nov. 1952, MAB.) Subject Headings: 1. Turbulence clouds 2. Updrafts 3. Aircraft design 4. Melbourne, Australia.—M.P.K.

5H-38

551.515.4:629.13

U. S. Weather Bureau, A report on thunderstorm conditions affecting flight operations. U. S. Weather Bureau, Technical Paper, No. 7, 1948. 32 p. 13 figs., 20 tables, 15 refs. DWB—Concluded that the thunderstorm, though a very complex structure, has basic circulation features following an identifiable pattern in the various stages of the storm's life cycle. Tables give frequency and percentage distribution of gust velocities and turbulence intensities and number and displacement coefficients of up- and downdrafts and various altitudes. Downdraft maxima were found at the 10,000 and 16,000 ft levels. (Same item as H-189, Aug. 1950, MAB.) Subject Headings: 1. Thunderstorm dynamics 2. Updrafts 3. Downdrafts.—M.P.K.

1949

5H-39

551.558.1:551.551:656.7

Briegleb, William C., The wind and you. *Flying*, New York, 44(5):30-32, 52, May 1949. DWB—Experiences of a pilot in flying in arid and mountainous regions. States that thermals sometimes extend up to 20,000 ft and base of cumulus clouds over thermals at 23,000 ft above sea level. Dust carried to over 15,000 ft. Some dust thermals carry violent downdrafts. Diagrams indicate nature and origin of thermals. (Same item as 2-135, Feb. 1950 and 3K-127, Nov. 1952, MAB.) Subject Headings: 1. Orographic turbulence 2. Thermals 3. Downdrafts.—M.R.

5H-40

551.558.1

Brooks, F. A. (Univ. of California), Mountain top vortices as causes of large errors in altimeter readings. *American Meteorological Society, Bulletin*, 30(2):39-44, Feb. 1949. fig., refs., eqs. DWB—Reports of altimeter errors as large as 3000 ft require some other explanation than that provided by the theory of barometric depression due to the flow of air over an airfoil-shaped mountain. Author contends that extreme pressure drops might be caused by tornado-like mountain-top vortices such as were observed on Mt. Fuji (see 5H-6 and -18 above) and Mt. Washington (by C. F. Brooks). Investigating "mountain tornadoes" by wind tunnel experiments, airplane reconnaissance and smoke camera observation suggested. Comment by ROBERT G. STONE. Subject Headings: 1. Mountain vortices 2. Altimeter errors 3. Air flow over mountains. I. Stone, R. G.—M.P.K.

5H-41

551.515.41:551.554

Byers, Horace R. and Battan, Louis J., Some effects of vertical wind shear on thunderstorm structure. *American Meteorological Society, Bulletin*, 30(5):168-175, May 1949. 7 figs., 10 refs. B—In a discussion of wind shear in thunderstorms and its relation to echo shear and to thunderstorm growth the authors enlarge on an earlier work by BYERS and BRAHAM (see 5H-33 above) and show that, if the hydrometeors from the upper part of the cloud fall outside the cloud (due to vertical air which displaces them away from the updraft region) they can initiate a downdraft outside the cell. (Same item as H-206, Aug. 1950, MAB.) Subject Headings: 1. Thunderstorm dynamics 2. Downdrafts 3. Wind shear.—M.P.K.

5H-42

551.515.4:551.501.81:629.13

Byers, Horace R. and Braham, Roscoe, R., Jr., The thunderstorm; report of the Thunderstorm Project. (A joint project of four U. S. Government Agencies; Air Force, Navy, National Advisory Committee for Aeronautics, and Weather Bureau.) Washington, D. C., U. S. Govt. Print. Off., 1949. 287 p. 254 figs., 49 tables, 63 refs., append. MH-BH—The final and most comprehensive of the Thunderstorm Project reports, containing: Pt. I on thunderstorm structure and

circulation (including a discussion of convection, turbulence and hydrometeors), Pt. II on the effect of thunderstorms on flight and Pt. III consisting of a series of case studies. (*Same item as H-Aug. 1950 and 3K-129, Nov. 1952, MAB.*) *Subject Headings:* 1. Thunderstorm turbulence 2. Thunderstorms 3. Aeronautical meteorology.—H.P.K.

5H-43

551.513.1:551

Colson, DeVer, *Air flow over a mountain barrier.* *American Geophysical Union, Transactions* 30(6):818-830, Dec. 1949. 10 figs., 2 tables, 10 refs., 17 eqs. DWB—Frictionless flow of an incompressible homogeneous air stream over a mountain barrier is discussed mathematically, with fixed lateral boundaries and then for a flow of infinite width. Streamlines and pressure contours calculated by graphical integration show a lee trough whose position and depth depend on wind velocity and mountain profile. With high speeds there is a secondary trough at mountain crest. Calculations are applied to an idealized Rocky Mountain profile in 39°N with two crests. A lee trough gives a trough in 90-100°W in agreement with observed 10,000 ft isobars and maximum frequent surface low pressure centers. (*Same item as 2.7-79 July 1951, MAB.*) *Subject Headings:* 1. Air flow over mountains 2. Lee effects 3. Rocky Mountains 4. North America.—C.E.P.B.

5H-44

551.554.3

Desmond, E. and Radok, U., *Note on vertical air currents on the Tasmanian air route.* *Weather Development and Research Bulletin*, Melbourne, No. 13:5-15, July 1949. figs., table, charts, 8 refs. DWB—Large regions of ascending and descending currents which produce changes of altitude which an airplane is incapable of surmounting are observed in the region between Tunbridge and 40°S. In one case cited, aircraft lost altitude (descent from 7000 ft to 6000 ft in smooth air) at rate of 500 ft/min despite full climbing power and was then uncontrollably relifted to 7500 ft. It is suggested that certain of these perturbations could be waves caused by the existence of an anticyclonic pressure inversion in conjunction with a pressure trough above the escarpment of the Tasmanian Plateau. *Subject Headings:* 1. Updrafts 2. Downdrafts 3. Tasmania.—M.P.K.

5H-45

551.551:551

Jones, R. F., *Relation between radar echoes from cumulus and cumulonimbus clouds and turbulence within these clouds.* A report on the first year's operation of the cumulonimbus radar at the Meteorological Office radar station at East Hill in co-operation with aircraft from the Aircraft Establishment at Farnborough. *Great Britain. Meteorological Research Committee, Memoir* No. 484, April 14, 1949. 16 p. 25 figs., 6 tables, 8 photos, 5 refs. Mimeographed. DWB—It has been found that radar echoes are useful in locating the area within Cu-clouds where the largest size drops exist (probably the areas of greatest updrafts, severe turbulence) but the problem becomes how to distinguish areas of greatest turbulence in the absence of large drops. Study of radar echo records and accelerometer data from Spitfire aircraft indicates that distinct columnar turbulence troughs in the radar echo vertical cross sections are associated with up- and downdrafts respectively and are indicative of the severity of turbulence to be expected. (*Same item as 3K-135, Nov. 1951, MAB.*) *Subject Headings:* 1. Turbulence in clouds 2. Updrafts 3. Downdrafts 4. Radar echoes.—M.P.K.

5H-46

551.558.1:551

Radok, U., *A remarkable thunderstorm flight record.* *Australian Journal of Scientific Research, A, Physical Sciences*, 2(4):550-563, Dec. 1949. 8 figs., table, 6 refs. MH-BH—Downdrafts of 130 ft/sec were indicated by the barograph record made in a sailplane during descent in a thunderstorm at Benalla, Victoria (from 12,400 ft to the surface). Records are reproduced and meteorological and aerological conditions discussed in detail. At 2 km the vertical velocity of 47 m/sec is out of all proportion to extremes recorded in Florida (Thunderstorm Project), which would imply a probability of 1 in one million of such occurring. Conclusion is that conditions in Australia are not identical with those in Florida. (*Same item as 2.2-103 Feb. 1951, MAB.*) *Subject Headings:* 1. Downdrafts 2. Thunderstorm dynamics 3. Gliding 4. Victoria 5. Australia.—M.R.

5H-47

551.558.1:551

Stevens, Welby R. (U. S. Weather Bureau), *Preliminary report on vertical currents and gustiness.* U. S. Weather Bureau, [1949?] 5 p. refs. Photo copy. DWB—A report prepared for NACA summarizing the knowledge to date "concerning vertical currents and gustiness in the atmosphere." Convective currents, their vertical extent, velocity, and relation to cumulus clouds are discussed. *Subject Headings:* 1. Vertical motion 2. Convection 3. Gustiness.—M.P.K.

1950

5H-48

551.551:551.515.4

Brice, D. A., *Cu-nim gusts. Some implications of an important investigation into the problem of storm flying.* *Flight*, London, 57(2142):32-34, Jan. 12, 1950. 2 photos. DLC—A short

concerned with the effect on aircraft of gusts likely to be encountered in thunderclouds. Information regarding maximum violence of gusts to be expected and relative severity of turbulence at different levels based on American experimental flights is included. (*Same item as 3K-147, Nov. 1952, MAB.*) *Subject Headings:* 1. Thunderstorm turbulence 2. Gustiness 3. Aeronautical meteorology.—M.P.K.

5H-49

551.515.4:551.558.1

Bunker, Andrew F., *Fluctuations of the vertical component of the wind associated with the outflow of cold air from a thunderstorm.* *American Meteorological Society, Bulletin*, 31(5):178-180, May 1950. 2 figs., 2 refs. Also: *Woods Hole Oceanographic Institution, Contribution*, No. 502. WB—Simultaneous records of air temperature and speed, direction and angle of inclination of wind made during the cold outflow from a thunderstorm at Woods Hole, Mass., July 28, 1949, are presented and discussed. An updraft of 20 cm/sec associated with the lifting action of the advancing cold air was observed for 15 seconds, about three times as long as the usual duration for up- and downdrafts caused by normal turbulence. (*Same item as 7-81, July 1950, MAB.*) *Subject Headings:* 1. Updrafts 2. Thunderstorms 3. Woods Hole, Mass.—M.P.K.

5H-50

551.558.1

Eldridge, R. H., *Pilot balloon ascent near cumulonimbus cloud.* *Meteorological Magazine*, London, 79(941):327-328, Nov. 1950. 2 figs. MH-BH—On July 27, 1940, in Suffolk a tail balloon showed downdrafts of about 500 ft/min for 3 minutes between 6000 and 4000 ft, associated with anticyclonic eddies of 100 and 300 yards diameter. (*Same item as 2.7-127, July 1951, MAB.*) *Subject Headings:* 1. Downdrafts 2. Eddies 3. Cumulonimbus clouds.—C.E.P.B.

5H-51

551.511:551.508.99:532.5

Fultz, Dave, *Experimental studies related to atmospheric flow around obstacles.* *Geofisica pura e Applicata*, 17(3-4):88-93, Oct.-Dec. 1950. 3 figs., 8 refs. In English. MH-BH—Laboratory experiments made at the University of Chicago to determine the manner in which fluids behave in a rotating hemispherical shell of liquid with respect to the zonal motion, are described and illustrated. This is a condensation of material contained in an article by FULTZ in *Tellus* (see item 2-61, Feb. 1951, MAB) with special reference to problems of air flow over mountains. (*Same item as 2.5-60, May 1951, MAB.*) *Subject Headings:* 1. Orographic effects 2. General circulation 3. Air flow over mountains 4. Fluid mechanics.—M.R.

5H-52

551.558.21

Kuettner, Joachim and Thompson, Philip Duncan, *Observations and theory of flow over long ridges.* *American Meteorological Society, Bulletin*, 31(5):168, May 1950. DWB—In a paper delivered at the Jan. 25, 1950 New York meeting of the American Meteorological Society, the authors outlined the various methods of determining air flow at heights up to 80,000 ft above mountains. Several theoretical approaches to the solution of observed flow, mentioned. Temperature and wind conditions under which Helmbar and Moazagotl clouds occur were illustrated. Maximum vertical component of wind cited was 4000 ft/min. Heights of lenticular clouds reported as 42,000 ft in lee of the Sierra Nevada and 70,000 ft (nacreous clouds) in Norway. Downdrafts thought more dangerous to aircraft than altimeter errors. *Subject Headings:* 1. Air flow over mountains 2. Downdrafts 3. Vertical velocities.—M.P.K.

5H-53

551.541:551.558.21

*Radok, U., *Report on a flight investigation of lee wave disturbances near Melbourne.* *Weather Development and Research Bulletin*, Melbourne, No. 15:28-39, May 1950. 4 figs., 7 refs., 3 tables. WB—Horizontal flights in a Tiger Moth aircraft at levels between 3,000 and 10,000 ft during strong westerly winds across the Dandenong ranges showed evidence of wave-like disturbances in their lee, with a particularly marked region of descending air directly over the ridge. In one case this region coincided with a strong positive temperature anomaly. Except at fairly low altitudes the observed vertical velocities do not agree well with theoretical values derived by QUENEY (*Amer. Met. Soc., Bull.*, 29:16, 1948) and LERA (*Zeit. f. ang. Math. u. Mech.*, 23:1, 1943). *Subject Headings:* 1. Lee waves 2. Downdrafts 3. Dandenong Range, Australia.—Author's abstract.

5H-54

551.551:551.558.21

Serra, Antonio, *Note di climatologie della Sardegna. I. Turbolenza e vortici sul massiccio montuoso del Sarrabus.* [Note on climatology of Sardinia. I. Turbulence and eddies over the Sarrabus Range.] *Rivista di Meteorologia Aeronautica*, 10(1):29-32, Jan./March 1950. 4 figs., f. Italian, French, English and German summaries p. 29. MH-BH—Situations likely to give rise to formation of an intense air turbulence or to whirlwinds on the Sarrabus range of mountains, W of Cagliari, are described together with the remarkable cloud forms resulting therefrom. (*Same*

item as 3K-159, Nov. 1952, MAB.) *Subject Headings:* 1. Air flow over mountains 2. Lee effects 3. Wave clouds 4. Sarrabus Range, Sardinia.—*Author's abstract.*

1951

5H-55

551.558.21:551.510.53:797

Bangs, Scholer, *To the stratosphere in a glider.* *Saturday Evening Post*, 224 (8):32-33, 94, 95, 100, Aug. 25, 1951. photos. **DLC**—Popular article on sailplane activities at Bishop, Calif., utilizing the Sierra Wave. Included is an interesting account of a P-38 flight, March 5, 1950, a day of unusually strong development of the Bishop Wave phenomena, during which the 8-ton plane was carried up to an altitude of over 30,000 ft encountering estimated updrafts of 8,000 ft/min. Reference made to the meteorological research program of the Sierra Wave Project, part of which is aimed at explaining altimeter errors. (Same item as 3.9-166, Sept. 1952, MAB.) *Subject Headings:* 1. Gliding 2. Sierra Wave Project 3. Altimeter errors 4. Bishop, Calif.—M.P.K.

5H-56

551.558.21:551.507.351 (74)

California. Univ. at Los Angeles. Dept. of Meteorology, **Sierra Wave Project.** Contract AF 19(122)-263, Quarterly Reports, No. 1-6, Sept. 1950-Dec. 1951. 6 pieces. **DWB**—These first 6 reports of the project give a list of personnel, a list of agencies cooperating in the project and brief accounts of preparatory, theoretical and field activities. The project is equipped with two modified Pratt-Reed gliders, Mitchell phototheodolites, ground radar sets, microbarograph stations, etc. The theoretical work is carried on by EINAR HÖILAND, MORTON G. WURTELE, JOSEPH KNOX and PAUL QUENEY. A few flights were made during the report periods; in one of them a sailplane was able to operate between 26,000 and 28,000 ft. Useful data were obtained and are being evaluated. Appendix A of Report No. 5, Sept. 1951, comprises an extensive treatment of fluid flow over a corrugated bed, by E. HÖILAND. *Subject Headings:* 1. Sierra Wave Project 2. Lee waves 3. Gliding 4. Sierra Nevada, Calif. I. Contract AF 19(122)-263 II. Holmboe, Jörgen III. Edings, James IV. Queney, Paul V. Höiland, Einar VI. Wurtele, M. G. VII. Knox, Joseph.—G.T.

5H-57

551.501.7:551.508.8

Corton, Edward L., Jr., *A radiosonde ascent through the Sierra Wave.* *U. S. Naval Ordnance Test Station, Technical Memorandum*, No. 225, Aug. 10, 1951. 14 p. 3 tables, 8 figs., 5 refs. **DLC**—Results of a radiosonde ascent Jan. 18, 1951 presented in tabular and graphical form showing the levels of updraft (maximum velocity 1200 ft/min), with a discontinuity surface at 6,000 ft. Horizontal wind velocities were somewhat lower in the downdrafts. Streamline slopes are tabulated and all results of this compared with those of previous ascents. (Same item as 4.8-39, Aug. 1952, MAB.) *Subject Headings:* 1. Updrafts 2. Sierra Wave Project 3. Orographic turbulence 4. Downdrafts.—*From author's abstract.*

5H-58

551.558.21:621

Frederickson, Paul S., *Eddy winds and sustained downdrafts.* *Trans World Airlines, System Operations Bulletin*, No. 51-9, Feb. 7, 1951. 1 p. diagrs. Mimeo. **DWB**—Sustained and possibly dangerous eddies or downdrafts may occur where a bluff or a ridge exists near a runway such as is the case at the Cincinnati, Albuquerque, Kansas City, Lages (Azores), Stephens (Newfoundland), Geneva, Zurich and Bombay airports which are on TWA routes. The eddy varies with direction and speed of wind in relation to orientation of a given runway. Surface turbulence may be severe when stray winds prevail. A diagram shows a possible position of the eddy or downdraft with respect to the obstacle. (Same item as 5.4-169, April 1954, MAB.) *Subject Headings:* 1. Orographic effects 2. Lee eddies 3. Downdrafts near airports.—M.R.

5H-59

551.558.21:551.547.1:621

French, George M. (CAA, Washington, D. C.), *Mountain winds and their effects on flight.* *Washington. Civil Aeronautics Board. Bureau of Safety Investigation. Safety Bulletin*, 18, July 12, 1951. 14 p. refs. **DLC**—A brief manual for pilots and operations personnel giving the present status of knowledge regarding wind flow and pressure patterns in the lee of high mountains. An analysis was made of all accidents which occurred in mountains during the period 1938-1950 to determine whether or not altimeter errors or wind conditions caused by the lee eddies could have been responsible. Only 4 cases occurred in the lee of mountains when winds were over 25 mph. The "Sierra Wave Project," to study lee effects in Bishops Valley, Calif., is described. (Same item as 3.9-169, Sept. 1952, MAB.) *Subject Headings:* 1. Lee effects 2. Altimeter errors 3. Air flow over mountains 4. Aircraft accidents.—M.R.

5H-60

551.558.21:551

Georgii, Walter (Univ. Nacional de Cuyo, Mendoza, Argentina), *El problema del vuelo sobre ondas en la Cordillera de Mendoza.* [The problem of wave gliding in the Mendoza Cordillera]

Revista Nacional de Aeronautica, Buenos Aires, 11 (117):16-19, 52-56, Dec. 1951. 26 figs. DWB—Account of scientific expedition to the Mendoza Cordillera. The formation of lee waves and of specific orographic clouds is explained, emphasizing the distribution of vertical velocities. (Same item as 5.4-170, April 1954, MAB.) Subject Headings: 1. Lee waves 2. Orographic effects 3. Vertical motion 4. Mendoza Cordillera, Argentina.—A.A.

5H-61 551.507.351:551.558.21
 Evans, William S., Jr., *Eight miles high. Soaring*, Memphis, Tenn., 15(1):3-5, 12, Jan./Feb. 1951. photo, 2 tables. DWB, DLC—A detailed account of a record sailplane ascent made by the author in Dec. 30, 1950, when he reached an indicated altitude of 42,000 ft near Bishop, Calif. Turbulence increased as the plane gained altitude but never became dangerous. Just below an cumulus cloud the turbulence was of peculiar nature similar to driving over a rough road at high speed. Maximum gusts were $+3\frac{1}{2}$ g. (Same item as 3K-207, Nov. 1952, MAB.) Subject Headings: 1. Gliding 2. Orographic turbulence 3. Sierra wave 4. Sierra Nevada, Calif.—M.R.

5H-62 551.558.21:551.511
 Jacoby, Bill, *A vortex possibility of the Sierra wave. Soaring*, Memphis, Tenn., 15(2):11, March-April, 1951. DWB—The author assumes that the flow of air across the Sierra is from west to east and that the general air mass has a temperature inversion that makes its lower layer very stable. Wave formation occurs when air, which spills over the passes with high velocity, is trapped, and then stagnant air interacts with high velocity cold air. The wave is composed of several primary vortices and their accompanying obstruction waves. (Same item as 3.9-168, Sept. 1952, MAB.) Subject Headings: 1. Vortexes 2. Sierra wave 3. Sierra Nevada, Calif.—I.L.D.

5H-63 551.558.21:797.5
 Kessel, Emil, *Soaring waves at Warm Springs Airport. Soaring*, Dallas, Texas, 15(4):10, July-Aug. 1951. graph. DLC—A schematic diagram shows relation of wave to topography from San Francisco Bay to altitude of 6000 ft to the lee of a 1500 ft ridge. At times the wave extends 2000 ft and has been known to give lift to a glider to 12,500 ft. Area of greatest turbulence is known to be along inversion surface between NW (cold maritime) and NE (warm continental) air. (Same item as 3.6-127, June 1952, MAB.) Subject Headings: 1. Orographic turbulence 2. Standing waves 3. Gliding 4. San Francisco Bay, Calif.—M.R.

5H-64 551.558.21
 Mallett, P. G., *Gliding*, London, 2:164-167, 1951. Also: Förchtgott, J., *The air flow round a hill. Ibid.*, p. 147. And Scorer, R. S., *The pressure field in front of a hill or that sinking in. Ibid.*, p. 70. DLC—Description of a flight near lenticular clouds at 20,000 ft in the lee of the Sierras on Jan. 12, 1951 during which up- and downdrafts beside these clouds were estimated to be 10 m/sec. Subject Headings: 1. Updrafts 2. Downdrafts 3. Lenticular clouds 4. Gliding 5. Förchtgott, J. II. Scorer, R. S.—F. H. Ludlam.

5H-65 551.558.2
 Meierhofer, W., *Wellenaufwind über Korsika. [Lee waves over Corsica.] Aero Revue Suisse*, 26(7):311-317, 1951. Original unchecked. DLC—Periodic variation of altitude observed on flight from Nice to Rome. With an airplane speed of 350 km/hr and a tailwind (WNW) of 70 km/hr, the amplitude of the wave at 3000 m altitude was about 500 m and the length about 7 km. Waves originated in the wind along the mountains of Corsica. Subject Headings: 1. Lee waves 2. Vertical motion 3. Corsica.—M.P.K.

5H-66 551.558.21:629.135
 Turner, H. S., *Standing waves and powered flight. Meteorological Magazine*, London, 80(946):109, April 1951. 3 figs., 4 refs. DLC—Describes some examples of standing waves reported by pilots in lee of high ground, with illustrative tephigrams. Pilots reported difficulty in maintaining altitude. (Same item as 2.11-123 Nov. 1951, MAB.) Subject Headings: 1. Lee waves 2. Aerial navigation.—C.E.P.B.

5H-67 551.558.1:629.13
 U. S. Civil Aeronautics Board, *United Air Lines, Inc., Fort Wayne, Indiana, April 28, 1951. Civil Aeronautics Board, Accident Investigation Report*, CA-234, File No:1-0024, Oct. 22, 1951. 2 diagrs., 2 appends. WB-WAS—An official report of the crash of a DC-3 when caught in the downdrafts and turbulence (gusts up to 85 mph) associated with a squall line. (Same item as 183, Nov. 1952, MAB.) Subject Headings: 1. Downdrafts 2. Thunderstorm turbulence 3. Squall lines 4. Aircraft accidents.—M.P.K.

1952

5H-68

Austin, A. R. I., **Wave clouds over southern England.** *Weather*, 7(2):50-53, Feb. 1952. 2 figs., table. DWB—Detailed observations over southern England, Sept. 24, 1951, of wave clouds at a series of heights up to 32,000 ft, which were produced by ridges less than 1000 ft high. A vertical speed of about 1.5 m/sec was estimated near a lenticular cloud at 22,000 ft. Notes by R. S. Scorer and F. H. Ludlam. (Same item as 3.6-140, June 1952, MAB.) *Subject Headings:* 1. Lenticular clouds 2. Standing waves 3. Vertical velocities 4. Southern England. I. Ludlam, F. H. II. Scorer, R. S.

5H-69

Bulavko, A. S. and Sorochenko, N. K., **Voskhodiashchie vozdukhnye potoki redkoï sily.** [Vertical air currents of unusual force.] *Meteorologiya i Gidrologiya*, No. 7:28-30, 1952. DLC—7 parachutists were dropped over the Borisov Region (Minsk province) at 5-30 p.m. of August 1, 1951, and landed, the first after 40 min, and the second after 2 hrs. The probable lift of the second one was assumed to be 3 km. The region was located in an area of diffused pressure field, with second cold front passing by and powerful cumulus clouds. The two layers of cumulus had bases at about 1200 m and 3100 m. Air temperature near the soil surface was 18-20°C, lapse rate was 0.7-0.8°C/1000 m. Thunder activity was registered in the region from afternoon to 8-9 p.m. (Same item as 4.8-140, Aug. 1953, MAB.) *Subject Headings:* 1. Updrafts 2. Borisov Region, U.S.S.R.—N.T.Z.

5H-70

Byers, Horace R. (Univ. of Chicago), **An example of a flight through a thunderstorm updraft.** *American Meteorological Society, Bulletin*, 33(5):211-212, May 1952. fig., ref. MH-BH—Detailed description of a traverse made at an altitude of about 20,000 ft through a thunderstorm over Ohio. Diagrammatic representation of the flight shows temperature, altitude, air speed and the distribution of the weather elements. The airplane was in an updraft which was about 5°C warmer than the environmental air. The increase in air speed combined with the constant power setting at which the flight was maintained placed the airplane in a nosedown position. (Same item as 4.4-123, Aug. 1953, MAB.) *Subject Headings:* 1. Thunderstorm flights 2. Updrafts 3. Airplane observations 4. Ohio.—I.L.D.

5H-71

Colson, DeVer (U. S. Weather Bur., Wash., D. C.), **Results of double-theodolite observations at Bishop, Calif., in connection with the "Bishop-Wave" phenomena.** *American Meteorological Society, Bulletin*, 33(3):107-116, March 1952. 14 figs., table, 9 refs. MH-BH—The standing wave patterns in the flow over and to the lee of mountain crests produced when air is forced over mountain ridges are manifested in lenticular cloud patterns which, with proper moisture distribution and atmospheric stability, are known as "Bishop" or "Sierra Waves" in the Owens Valley of California. The use of double theodolite pilot balloons to study the actual air currents (including updrafts and downdrafts) in this area is described and the results of observations for the period 1948-1951 are discussed. "Comparisons between single and double computations are shown. The mean actual ascension rates are compared for each month and the mean ascension rates for the entire period are compared with the standard assumed single-theodolite ascension rates. Relations between the mean annual ascension rates and the local topography, the elevation of the balloon, the direction and speed of the general upper level wind are shown." Examples of standing waves obtained by glider and double-theodolite data giving wave lengths of about 20 km are presented. Photographs of wave clouds and of a panoramic view of the Owens Valley are included. (Same item as 4.3-140, March 1953, MAB.) *Subject Headings:* 1. Lee waves 2. Bishop waves 3. Balloon ascensions 4. Double theodolite observation 5. Downdrafts 6. Bishop, Calif.—I.L.D.

5H-72

Frederickson, Paul S., **Effect of encountering a wind shift during a turn.** *Trans World Airline Inc., System Operations Bulletin*, No. 52-5, March 3, 1952. 3 p. diag. Mimeo. DWB—A description of the flight path of a United Airlines Douglas DC-3 which crashed near the runway at Fort Wayne, Ind., on April 28, 1951 at 1931 CST, and of meteorological conditions during a violent frontal passage which was responsible for the accident, shows that it is safer to make a right turn than a left turn when entering such a squall, and even safer to enter the squall line at right angles to the wind line since this involves the shortest flight path through the downdraft zone. The plane in question evidently was carried by the squall (with gusts up to 80 mph) for 2 or 3 mi. Another flight made the same flight path without accident but being a few seconds earlier was not caught by the approach squall. (Same item as 5.1-191, Jan. 1954, MAB.) *Subject Headings:* 1. Aircraft accidents 2. Squalls 3. Downdrafts 4. Fort Wayne, Indiana.—M.R.

5H-73

551.551:551.515.4:629.13

Harney, Patrick J., **Why you fly thunderstorms the way you do.** *Aero Digest*, New York, 2(7):78-99, Feb. 1952. 5 figs., photo. DLC—The meteorological conditions which necessitate the observance of rules for "airspeed, altitude and attitude" for pilots traversing thunderstorms are fully explained. The alignment of thunderstorms and terrain and turbulence to be expected near mountain ranges are discussed. (Same item as 3K-193, Nov. 1952, MAB.) *Subject Headings:* 1. Thunderstorm turbulence 2. Orographic turbulence 3. Aeronautical meteorology.—M.P.K.

5H-74

551.551:797.5

High flight in a mountain lee wave. *The Thermal*, Los Angeles, 14(7):[6-8], June 1952. Pub. by Southern California Soaring Association. Copy in files of Mr. DeVer Colson, U. S. Weather Bureau, Washington, D. C.—Sailplane pilot's report of a routine wave flight made on March 19, 1952 over the Sierra Range for the Sierra Wave Project during which an altitude of over 40,000 ft was attained. Severe turbulence was encountered during the tow in the area of a massive roll cloud over the valley. (Same item as 3K-195, Nov. 1952, MAB.) *Subject Headings:* 1. Orographic turbulence 2. Gliding 3. Lee waves 4. Sierra Nevada, Calif. I. Sierra Wave Project.—M.P.K.

5H-75

551.558.21:629.13

Jenkins, C. F., **Forecasting the mountain wave.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics*, No. 15, Sept. 1952. 32 p. figs. DWB—Paper deals with one of the most dangerous of flight conditions. Discussion based on extensive observations in the Sierra Nevada Mountains, made mainly from sailplanes. A cross section of the air flow over mountain ridges is discussed. The characteristic cloud forms are: 1) the föhn wall, which hides the mountains and is connected with downdrafts up to 5000 ft/min; 2) the rotor cloud in the lee, with long updrafts and severe turbulence; 3) lenticular clouds above the rotor; 4) mother of pearl clouds at a height of 25 km. Under dry conditions, no clouds exist, but the danger still remains. Tips on flying the wave are given. A number of mean and single characteristic synoptic charts and wind and temperature profiles are presented in order to show the possibilities of forecasting. The most favorable condition is the approach of a cold front and/or a trough aloft from west or northwest. Wind speed of 25 knots or more, normal to the range line at mountain top level is necessary for a well developed wave, as well as a stable state of the air below 600 mb during the approach of the trough. (Same item as 5.1-211, Jan. 1954, MAB.) *Subject Headings:* 1. Air flow over mountains 2. Sierra wave 3. Downdrafts 4. Orographic turbulence 5. Sierra Nevada, Calif.—A.A.

5H-76

551.576.11:551.558.21

Ludlam, Frank Henry, **Orographic cirrus clouds.** *Royal Meteorological Society. Quarterly Journal*, 78(338):554-562, Oct. 1952. 5 figs., 2 plates, table, 7 refs. DWB—Physics of formation of lenticular cirrus discussed. Observations of cirrus formation to leeward of hills about 1000 ft W. of Dunstable, England, show that such low ridges or hills "can disturb the air flow considerably at levels up to at least 30,000 ft," displacing the upper air vertically 2000 ft or more at wind speeds >1 m/sec. Diurnal variation of cirrus (minimum midday) is explained by reduction of orographic wave disturbance. (Same item as 4.2-196, Feb. 1953, MAB.) *Subject Headings:* 1. Cirrus clouds 2. Lee effects 3. Updrafts.—C.E.P.B., M.P.K.

5H-77

551.558.1:551.553.11

Malkus, Joanne Starr and Bunker, Andrew F., **Observational studies of the air flow over Nantucket Island during the summer of 1950.** Woods Hole Oceanographic Institution, Contract N6onr-27702, NR-082-021, Project Marine Meteorology, Technical Report No. 15, Sept. 1951. 41 p. 41 figs., 18 tables, 9 refs. Also: Stern, Melvin E. and Malkus, Joanne Starr, **Airflow over a heated island.** *Ibid.*, No. 18, April 1952. 47 p. diagrs., refs., eqs. DWB—During the summer of 1950, eight individual case studies were made of air flow, cloud and aerological conditions over Nantucket Island. Since the island is nowhere higher than 15 m above sea level, and there are no orographic obstructions or latitudinal factors to consider, it is thought that this study will give a good picture of the effect of local heating on a marine air mass. Cloud photographs, airplane windings, cross sections and air flow diagrams are presented for each case, with some discussion. In addition to usual temperature, humidity and wind data for various heights, the turbulence index, water temperatures, heat flow at ground and solar radiation records are presented. In No. 18, streamlines of the mean convective motions arising as the result of the passage of a stable atmosphere over a heated island are investigated. The effects of changes of wind speed, stability and eddy conductivity are pictured, discussed and compared with observations. (Same item as 5A-186, Jan. 1954, MAB. See also 4.8-159, Aug. 1953, MAB.) *Subject Headings:* 1. Marine meteorology 2. Air flow over islands 3. Convective clouds 4. Turbulence index 5. Nantucket Island. I. Woods Hole Oceanographic Institution II. Contract N6onr-27702 (NR-082-021) III. Stern, Melvin E.—R.

5H-78

551.558.21:6

Neilan, J. C., **The higher the fewer. Some thoughts on airline safety-heights over hilly terrain.** *Flight*, London, 61:290, March 14, 1952. **DLC**—Author suggests "safety heights" of 2000 ft above highest peak within 30 miles of track in winds less than 30 knots and 3000 ft in winds exceeding 30 knots. An additional 1000 ft should be added if the peaks in question are more than 5000 ft above the lowest ground within 30 miles. *Subject Headings:* 1. Aircraft accidents 2. Downdrafts. *M.P.K.*

5H-79

551

Painter, H. E., **Vertical currents observed at Habbaniya, May 6, 1952.** *Meteorological Magazine*, London, 81(965):339-340, Nov. 1952. 2 figs., ref. **MH-BH**—Rawind ascent in very unstable air showed downward velocities up to 2100 ft/min near a low pressure center. (Same item as 4.4-1 April 1953, *MAB.*) *Subject Headings:* 1. Downdrafts 2. Habbaniya, Iraq.—*C.E.P.B.*

5H-80

551.511:551.55

Queney, Paul, **Sierra Wave Project.** California. University at Los Angeles. Dept. of Meteorology, Contract AF 19(122)-263, Scientific Report, No. 1, July 1952. 89 p. 30 figs., numerous eqs. Photostat of ms. **DWB**—An elaborate theoretical study with numerous schematic diagrams. The first part consists of a treatment of the use of conformal mapping for the perturbation theory of two dimensional flows. Pt. II deals with Rayleigh waves in a two dimensional flow. Pt. III a system of constant vorticity currents (numerous special cases). Pt. IV concerns inviscid problems in a system of Couette-flows. For further information "On lee waves in the interface separating two barotropic layers," see Scientific Report No. 2 by M. G. WURTELE, June 1952. *Subject Headings:* 1. Mechanics of the atmosphere 2. Fluid flows 3. Sierra waves. I. California. University at Los Angeles. Dept. of Meteorology II. Contract AF 19(122)-263 III. Wurtele, M. G.—*M.R.*

5H-81

551.511:551.55

Ray Choudhuri, S. N., **On thermodynamics of downdrafts.** *Indian Journal of Meteorology and Geophysics*, Delhi, 3(1):49-52, Jan. 1952. 2 figs., 4 refs. **MH-BH**—The thermodynamic properties of downdrafts as analyzed by the parcel method of KAPLAN and the entrainment-mixing method of BYERS and BRAHAM are discussed in detail. The author concludes that the results by the latter method is more in accord with the factual evidence but that the difference between the two approaches is quantitative rather than qualitative. (Same item as 4.8-93, Aug. 1952, *MAB.*) *Subject Headings:* 1. Thermodynamics of the atmosphere 2. Downdrafts.—*I.L.D.*

5H-82

551.55

*Saudek, Victor Mead and Eldredge, Richard Calvin, **Work carried out by the Southern California Soaring Association, Inc. in Phase II of the Mountain Wave Project, October 1951-October 1952.** California. University at Los Angeles. Dept. of Meteorology, Mountain Wave Project, Contract AF 19(122)-263, Supplementary Report No. 3, [1952?]. 153 p. figs., tables, photographs. **DWB**—Operational reports of sailplane and powered flights in the orographic lee waves of the Sierra Nevada. Some flights (several exceeding 40,000 ft) explored waves under conditions of high altitude turbulence and in the presence of jet streams. Included in reports are descriptions of equipment, instrumentation, operations, assessment of data, suggestions for the guidance of all flights, the results and conclusions pertinent to the activities of this Association in Phases I and II, and recommendations for possible future activities. See also, Southern California Soaring Association, Inc., Reports No. 1 and 2, on the activities of that Association in Phases I and II, Oct. 1950-1951 and Oct. 1951-Oct. 1952, of the Mountain Wave Project (formerly the Sierra Wave Project). *Subject Headings:* 1. Sierra Wave Project 2. Lee waves 3. Free air turbulence 4. Jet streams 5. Sierra Nevada, Calif. I. Southern California Soaring Association, Inc. II. Contract AF 19(122)-263 III. California. University at Los Angeles, Dept. of Meteorology IV. Sierra Wave Project. *From authors' summary.*

5H-83

551.55

Scorer, Robert S., **Airflow over mountains.** *Science Progress*, London, 40(159):461-477, July 1952. 11 figs., 2 photos, 12 refs. **DWB**—An account is given of observations of lee waves behind mountain ridges. Applications of the equations of motion of a stably stratified air mass are summarized with cross sections, describing theories of LYRA, QUENEY and SCORER. For SCORER's five types of barostromatic (gravity stratification) flow (laminar, standing eddy, wave, two types of rotor streaming) are illustrated. Some remarks on fictitious inversions and orographic rainfall are included. (Same item as 3.10-207, Oct. 1952, *MAB.*) *Subject Headings:* 1. Lee waves 2. Lee eddies 3. Air flow over mountains.—*C.E.P.B.*

5H-84

551.558

Smalley, Clarence L. (U. S. Weather Bur., Forecast Center, San Bruno, Calif.), **Unusual vertical air currents in the vicinity of Warm Springs, California, October 29, 1950.** *American Meteorological Society, Bulletin*, 33(7):299-302, Sept. 1952. 3 figs., table, 2 refs. **MH-BH**—Several descriptions of unusual vertical air currents encountered by sailplane pilots near Warm Springs, Calif., indicate that the vertical waves in the airflow "were confined to the layer above the inversion since the pilots entered lift at about 3000 ft, while they had encountered only light turbulence below that level." Using the pilots' descriptions and pilot balloon observations (given in a table and plotted on a pseudo-adiabatic chart) the author constructed a schematic picture of the probable wave formation illustrated in a diagram). The observed conditions are found to agree with results of the formula of ELIASSEN for vertical wave length and with that of HAURWITZ for the horizontal wave length "in the wave pattern in the lower stratocumulus clouds near the lower inversion surface." (Same item as 56-155, June 1953, MAB.) **Subject Headings:** 1. Vertical currents 2. Air flow over mountains 3. Lee waves 4. Warm Springs, Calif.—I.L.D.

5H-85

551.551.7:551.558.21

Turner, H. S., **Severe turbulence over the Inner Hebrides.** *Meteorological Magazine*, London, (1962):239-241, Aug. 1952. fig., ref. **DWB**—A pilot flying from Glasgow to Benbecula (Outer Hebrides, Scotland) in a strong stable SW current on Dec. 21, 1951, noted alternate up and down currents of 500-1000 ft/min, attributed to standing waves of length 6 mi. Over Rhum Island severe turbulence occurred, attributed to interference by a separate wave train set up by the island. (Same item as 3K-201, Nov. 1952, MAB.) **Subject Headings:** 1. Atmospheric turbulence 2. Standing waves 3. Updrafts 4. Downdrafts 5. Inner Hebrides.—C.E.P.B.

5H-86

551.558.21

Vertical air motion over northern England and Southern Scotland November 27, 1951. *Meteorological Magazine*, London, 81(959):153-154, May, 1952. 3 refs. **MH-BH**—Aircraft at 13,000 ft experienced up-currents of about 750 ft/min and downdrafts of 400-500 ft/min probably due to lee waves over the mountains. (Same item as 3.9-171, Sept. 1952, MAB.) **Subject Headings:** 1. Updrafts 2. Downdrafts 3. Northern England 4. Scotland.—C.E.P.B.

5H-87

551.558.21:532.59

Ziererp, J., **Leewellen bei geschichteter Anströmung.** [Lee waves in a stratified current.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 35:85-90, 1952. 15 figs., 15 eqs. **MH-BH**—A two-dimensional equation is developed for a confluent up-current approaching an obstacle. From the solution the stream lines are deduced for different profiles. Study is essentially an extension of LYRA's theory of lee waves to mean wind varying with height. (Same item as 3.10-18, Oct. 1952, MAB.) **Subject Headings:** 1. Lee waves 2. Wave mechanics.—C.E.P.B.

1953

5H-88

551.551:797.5

Air currents you should know. *Flying Safety*, Wash., D. C., 9(7):14-15, July 1953. diagr. **DWB**—Simple but original schematic diagrams are presented illustrating the types of air circulation which affect a glider: 1) convectonal currents which cause bumpiness; 2) orographic turbulence (airflow over rough terrain) and 3) frontal or cyclonic turbulence and gales (gradients produce strong winds). **Subject Headings:** 1. Atmospheric turbulence 2. Schematic diagrams 3. Gliding flights, M.R.

5H-89

551.558.1:551.576.11:551.515.4

Day, G. J., **Unusually vigorous cumulonimbus cloud over southern England.** *Meteorological Magazine*, London, 82(77):342-344, Nov. 1953. fig., 3 refs. **MH-BH**—July 1, 1953, a plane at Farnborough was thrown up from 29,000 to 38,500 ft at a rate probably >80 ft/s. Echo tops rose 2000 ft/min and reached 43,000 ft. Very heavy rain fell to the east over a small sharply limited area. (Same item as 5.3-229, March 1954, MAB.) **Subject Headings:** 1. Updrafts 2. Cumulonimbus clouds 3. Farnborough, England.—C.E.P.B.

5H-90

551.513:551.557

Endlich, Roy M., **A study of vertical velocities in the vicinity of jet streams.** *Journal of Meteorology*, 10(6):407-415, Dec. 1953. 23 figs., 12 refs. **MH-BH**—Vertical velocity W was deduced from change of temperature in 3 hours at a point moving with wind on 500 or 300 mb surface, by $W = (\delta T / \delta t) / (\gamma - \gamma_d)$. Isanabats were constructed and checked in various ways including comparison with clouds. Values >10 cm/s (up to 25 cm/s) were found. Cases analyzed include straight westerly flow and cyclogenesis. The strongest centers of vertical velocity were in or near

jet stream, rising centers mainly to E of troughs and descending centers to W, but without particular geometric relation to the jet. Some evidence indicates that the mean circulation around the jet is thermally indirect. (*Same item as 5.6-117, June 1954, MAB.*) *Subject Headings:* 1. Jet stream 2. Updrafts 3. Downdrafts.—C.E.P.B.

5H-91

551.551

Garisch, H., *Zur vertikalen Windgeschwindigkeit bei Bora*. [Vertical wind velocity during Bora.] *Zeitschrift für Meteorologie*, 7 (8):248-249, Aug. 1953. Remarks by H. Prügel. **MH-BH** Author criticizes an earlier statement by H. PRÜGEL (*Zeit. für Met.*, v. 3, 1949) that no measurements of vertical wind velocity during a "Bora" on the Dalmatian coast are available. He reports an estimate of an average vertical wind velocity 5.3 m/sec and perhaps even 11 Beaufort or 27 m/sec during the course of a trip from Jablonec to Senj in 1944. H. PRÜGEL disputes this estimate and contends that the average vertical component of the extreme value 27 m/sec after its resolution into horizontal and vertical components would be about 4 m/sec. This value may be compared with that of a mean value >8 m/sec observed during a flight. *Subject Headings:* 1. Bora 2. Vertical wind velocity 3. Dalmatian Coast. I. Prügel, H.—I.L.D.

5H-92

551.558.21:79

Georgeson, S. H., *A lee-wave in New Zealand*. *Gliding*, London, 3(4):178, Winter 1952-53. **DWB**—Supplementing a description (*Ibid.*, 3(1), Spring 1952) of a wave flight in New Zealand 10,600 ft, the author tells of a climb to 13,000 ft during which his sailplane experienced 15 ft/sec on the forward edge of one of a series of lenticulars to leeward of the Southern Alps. *Subject Headings:* 1. Gliding 2. Updrafts 3. Lenticular clouds 4. Southern Alps, New Zealand.—M.P.K.

5H-93

551.5:797.56

Hirth, Wolfram and Brütting, Georg (eds.), *Handbuch des Segelfliegens*. [Handbook of sailplane flight.] 6th ed. Stuttgart, Franckh'sche Verlagshandlung, 1953. 364 p. 231 figs. (illustrations and photographs). **DWB, DLC**—Chapters entitled "Wetterkunde für Segelflieger," (Meteorological for sailplane pilots), p. 32-44 and one on Lee waves, p. 220-223 by FRITZ HÖHNDORF; a chapter entitled "Die Aufwinde," (Updrafts), p. 209-216 by WOLFRAM HIRTH; one by P. STEINIG entitled "Wellenaufwind," (Wave updraft), p. 217-219; and one by JOACHIM KÜTTNER, "600 km in 6 Stunden: Einen der Meilensteine in der Entwicklung des motorlosen Menschenflugs," (600 km in 6 hours: One of the milestones in the development of motorless flight by man), p. 289-302, are among the 40 articles by various authors in this compendium of knowledge and experiences in gliding (from the theoretical to the mechanical and operational aspects). *Subject Headings:* 1. Aeronautical meteorology 2. Gliding 3. Sierra Wave project 4. Updrafts 5. Lee waves 6. Compendiums. Höhndorf, Fritz II. Kuettner, Joachim III. Steinig, P.—M.R.

5H-94

551.558:551.57

*Hutchings, J. W. and Farkas, Edith, *Some estimates of vertical motion from observed precipitation intensities*. *New Zealand. Meteorological Office, Technical Note*, No. 99, July 8, 1953. 2 p. table. **DWB**—Vertical velocities occurring in the troposphere are calculated for several stations in the New Zealand area using the observed rates of precipitation at the ground and upper air temperature data obtained by radiosondes. The results are in good agreement with the order of magnitude of vertical velocities observed in similar situations in other parts of the world. (*Same item as 5.2-184, Feb. 1954, MAB.*) *Subject Headings:* 1. Vertical velocities 2. Rain intensities 3. Upper air temperature data 4. New Zealand.—Authors' abstract.

5H-95

551.558.21:61

§Jacobs, L., *Orographic effects on wind with special reference to the safety of aircraft*. *Meteorological Magazine*, London, 82(967):18-26, Jan. 1953. fig., 30 refs. **MH-BH**—A discussion of wind waves sometimes extending to great heights, in the lee of obstacles, with special reference to GIBB (J. H. FIELD and R. WARDEN), Mt. Fuji (M. ABE) and theoretical studies by F. A. BROOKS and H. ROUSE. In the discussion R. S. SCORER summarized unpublished work on stability of air stream. A number of others spoke. (*Same item as 4.10-183, Oct. 1953, MAB.*) *Subject Headings:* 1. Wind waves 2. Orographic effects. I. Scorer, R. S.—C.E.P.B.

5H-96

551.577.3:551.513.2:551

Johnson, D. H. and Daniels, Sylvia, *Rainfall in relation to the jet streams*. *Great Britain. Meteorological Research Committee, M.R.P.*, No. 803. May 1, 1953. 4 p. 5 figs., table, 1 mimeo. **GB-MO**—Rainfall in British Isles was tabulated against position in regard to axis of entrance, center and exit of jet streams. Mean per hour: Entrance, left of axis 0.9 mm, right 1.8 mm; Center, left 2.4, right 2.3; Exit, left 4.6, right 2.3. Amounts within 50 mi of axis generally small. The preponderance of rainfall to right of confluence and left of diffluence implies mean cross

ical circulations with ascent beneath the right axis and left exit, and descent beneath left entrance and right exit, in accord with dynamical theory. (Same item as 5.6-220, June 1954, MAB.) *Subject Headings:* 1. Precipitation variations 2. Jet stream 3. Vertical motion 4. British Isles.—C.E.P.B.

5H-97

551.558.1:551.576.1:551.515

Jones, R. F., *Five flights through a thunderstorm belt*. Great Britain. *Meteorological Research Committee, M.R.P.*, No. 820, June 10, 1953. 8 p. 5 figs., 2 plates, table, 4 refs. Mimeo. GB-MO 5: Royal Meteorological Society, *Quarterly Journal*, 80(345):377-387, July 1954. MH-BH Accelerometer, altimeter and temperature records during flights through CuNb clouds are presented in curves and discussed. Up and down currents of 20 ft/sec or more occurred near together in the cloud; in one case an upward speed of 30 ft/sec changed to a downward speed of 23 ft/sec in 10 yards. Outside the cloud down currents may exceed 10 ft/sec but not up currents. Results correlated with 10 cm radar; biggest gusts all occurred within the echoing part of the cloud. (Same item as 5.3-232, March 1954, MAB.) *Subject Headings:* 1. Updrafts 2. Downdrafts 3. Thunderstorms 4. Cumulonimbus clouds.—C.E.P.B.

5H-98

551.515.8:551.553.8

Koschmieder, Harald H., *Elementare Theorie der Linienböen und Schlotströmungen*. [Elementary theory of line squalls and vertical currents.] *Flug-meteorologische Forschungsarbeiten*, 1, 1953. 88 p. 42 figs., 3 tables, refs., numerous eqs. DWB—Pt. 1 deals with the kinematic theory of line squalls. Squalls in general, line squalls, squall clouds, etc. are first defined. The author then goes into: superposition of two-dimensional nonrotating fields; horizontal rotors; double horizontal rotors with opposing circulations and three or more horizontal rotors. Pt. 2 deals in the same manner with vertical currents (stationary vertical currents, pulsating currents, etc.). Appendix gives extensive examples of application of theory to practical calculations. *Subject Headings:* 1. Line squall theory 2. Vertical current theory.—K.M.

5H-99

551.558.21:797.5

Kuettner, Joachim P. (Geoph. Res. Div. Cambridge, Mass.), *Over Death Valley, Skull Mountain and Funeral Peak*. Soaring, Dallas, Texas, 17(3):7-10, May/June, 1953. Also: *High flying on Big Wave*. *ibid.*, 17(4):35-37, July/Aug. 1953. diag., chart. "Scientific report . . . received 1952 Tuntland Award." DWB—The author who is the world's leading authority on mountain flying has won the 1952 Tuntland award for this exciting report on his 700 km (437 mile) record breaking cross-country glider flight from Bishop, Calif., in the Sierras to Williams, Ariz., on March 19, 1952. Conditions on the previous day and on the day of the flight are given in detail, including temperature and winds up to 45-60 thousand feet, etc. Map and cross section show course in relation to topography and atmospheric conditions, respectively. Successive lee waves (7) were used to extend the flight range, which could have been much greater had the flight started earlier and not been concluded in darkness. Precautions for future flights, which could be made about 5 times a year are given. *Subject Headings:* 1. Lee waves 2. Gliding 3. Southwestern United States 4. Sierra Nevada, Calif.—M.R.

5H-100

551.558.21:629.13

Kuettner, Joachim and Jenkins, C. F., *Flight aspects of the mountain wave*. U. S. Air Force. *Wallops Research Center, Air Force Surveys in Geophysics*, No. 35; *AFCRC Technical Report*, 55-36, 1953. 19 p. 14 figs. MH-BH. Summary in *Flying Safety*, Washington, D. C. 10(1): 1-8, Jan. 1954. DWB—Mountain waves occur when strong winds, increasing with altitude several thousand feet above the mountain tops, blow at right angles (or within 50° of perpendicular) to the range, and when there is an inversion or stable layer between the ridge and the cloud level. Over the Sierras, such waves occur about one day out of four in winter. Similar waves occur in many other parts of the world. A pilot can get into serious trouble if he flies downwind in the vicinity of the wave especially in the "roll cloud" above the range. He may be drawn into the downdraft—sometimes as strong as 5000 ft/min with gust velocities as high as 40 ft/sec stronger than those measured by the Thunderstorm Project—such downdrafts are especially dangerous in the proximity of rugged peaks, covered often by a deceptive "cap cloud." Furthermore, altimeters may be in error by as much as 1000-2500 ft because of dynamic and temperature effects, so the pilot should allow extra altitude for such an occurrence. Other rules for flying under these conditions are: 1) fly around the wave area or 50% higher than the range; 2) do not fly into the wave; 3) avoid rotor (roll) clouds; 4) avoid cap clouds (föhn wall); 5) avoid high lenticular clouds if they are ragged; 6) use updrafts to gain altitude if flying upwind and 7) avoid strong waves in turbulent flight. The details, charts, excellent photographs and vivid description of a flight through such a wave accompany the above rules as devised by the author and those working on the Sierra Wave Project. *Subject Headings:* 1. Mountain wave flying 2. Lee waves 3. Sierra Wave Project 4. Aeronautical meteorology 5. Downdrafts 6. Sierra Nevada, Calif.—M.R.

5H-101

532.5:551.55

Long, Robert R. (*Johns Hopkins Univ.*), A laboratory model resembling the "Bishop-Wa phenomenon. *American Meteorological Society, Bulletin*, 34(5):205-211, May 1953. 5 figs., 6 refs. DWB—A description is given of the flow of a three-layer system of immiscible fluids over an obstacle immersed in the lowest liquid. A tentative suggestion is offered that some features of the motion may be similar to the flow of air over the Sierra range near Bishop, California. Some arguments are advanced supporting this suggestion. *Subject Headings*: 1. Laboratory models 2. Bishop wave 3. Hydrodynamics.—*Author's abstract*.

5H-102

551.558.1:551.57

Ludlam, F. H. and Scorer, R. S., Convection in the atmosphere. *Royal Meteorological Society, Quarterly Journal*, 79(341):317-341, July 1953. 2 figs., 65 refs. DWB—Authors aim at "a unified picture of what happens during the process of convection" and summarize much recent research. They deal first with slow convection, instability resulting in cellular patterns (compared with laboratory experiments), transverse rolls or billows and mammatus in which motion is downward in the middle. For thermals the bubble theory with amalgamation of wakes is preferred to chimney theory. Influence of shearing and source of warm air are considered, importance of ground being emphasized. Types of motion are described: streets, stable rotating thermals (dust devils, waterspouts), compensating down currents vs. removal of air by sonic disturbance, the phenomena of sea breezes and the sea breeze front. The formation of Cu is studied including limitation of height of small single-bubble Cu by mixing with clear air. Large Cu are regarded as chaotic assemblage of bubbles (turrets) and their wakes; measurements of temperature and updrafts are quoted in relation to cloud-top height and maintenance of convection. Finally, authors discuss Cu formation over oceans, diurnal variations of convection and forecasting Cu. (*Same item as 4.11-2*, Nov. 1953, *MAB*.) *Subject Headings*: 1. Convection 2. Updrafts 3. Cloud physics 4. Cumulus cloud formation.—*C.E.P.B.*

5H-103

551.558:558

Miller, Banner I. (*Weather Bur. San Antonio, Texas*), High level vertical motion in relation to tropical rainfall. *Monthly Weather Review*, 81(10):319-325, Oct. 1953. 3 figs., table, 8 refs. BH—A single station technique is used to compute vertical velocities over San Juan, P. R. from standard constant pressure levels from 850 to 100 mb. Periods of strong upward motion are observed to occur rather frequently within the layer 400 to 100 mb and these are discussed in relation to subsequent precipitation patterns. *Subject Headings*: 1. Vertical motion 2. Precipitation forecasting 3. San Juan, Puerto Rico.—*Author's abstract*.

5H-104

551.558.21:558

Palm, Enok, On the formation of surface waves in a fluid flowing over a corrugated bed on the development of mountain waves. *Astrophysica Norvegica*, Oslo, 5(3), Oct. 1953. 18 figs., 5 refs., 133 eqs. DWB—A theoretical treatment of the surface wave system, originating behind an inequality in the bed of rivers and channels or on the interface between different fluid masses in fjords. The problem, which is related to ship waves, is treated as an initial problem giving exact solutions in front and behind the disturbance in distinction to Kelvin, who was forced to introduce a semi-empirical assumption. A sinusoidal and then an arbitrary bottom was assumed, deriving solutions from the initial moment up to the full development of the wave pattern. Application to mountain waves as a two dimensional problem, neglecting the rotation of the fluid is discussed. *Subject Headings*: 1. Wave mechanics 2. Lee waves 3. Hydrodynamics.—*Author's abstract*.

5H-105

551.558.21:558

Rowell, Betty, Table Mountain wave. *Gliding*, London, 4(1):8-9, Spring 1953. port., 1 fig. DWB—An explanation of the mechanism of the wave near Cape Town by its discoverer is accompanied by a sketch of the region and a description of a flight up to 10,000 ft. (*Same item as 5.11-2*, June 1954, *MAB*.) *Subject Headings*: 1. Standing waves 2. Gliding 3. Table Mountain, South Africa.—*G.T.*

5H-106

551.558.1

Royal Meteorological Society and British Gliding Association, Fair weather cumulus. *Meteorological Society, Quarterly Journal*, 79(341):420-436, July 1953. Discussion: A. H. J. Atmospheric convection; the structure of thermals below cloud base. p. 420-424, 5 figs., 10 refs.; D. G. James, Fluctuations of temperature below cumulus clouds. p. 425-428, fig., 3 refs.; W. E. Thermals as seen by glider pilots. p. 429-430; Ludlam, F. H., The sub-cloud layer over the sea. p. 430-431, 3 figs., ref. Discussion p. 431-436, fig. DWB—YATES assembles facts about the known to glider pilots: diameter about 1000 ft, upward velocity 0-15 ft/sec, temperature of air above surrounding air, periodicity 5-15 min, one to each sq $\frac{1}{2}$ mile. A bubble and wake model is suggested.

veloped for calm and wind and airflow sketched. JAMES discusses traces of rapid temperature fluctuations at 500 ft intervals below a Cu; these show: at 500 ft bubbles of all diameters from 200–600 ft, 1000–2500 ft, bubbles decreasing in size and frequency; at 3000 ft, intense turbulent mixing. WELCH describes gliding in thermals and suggests research. LUDLAM describes changes of dry and wet lapse rates on entering layer several hundred feet thick below bases of Cu in England. A good discussion follows. (Same item as 5.3–231, March 1954, MAB.) Subject Headings: 1. Thermals 2. Gliding. I. Yates, A. H. II. James, D. G. III. Welch, L. IV. Ludlam, F. H.—C.E.P.B.

5H-107

551.558.1

Sansom, H. W. and Gross, J., A strong descending air current at Nairobi. *Weather*, 8(9):282–283, 1953. table. MH-BH—Descending air current of 1000 ft/min observed by radar and radio-sonde between 12,000 and 15,000 ft on March 24, 1953. (Same item as 5.3–233, March 1954, MAB.) Subject Headings: 1. Downdrafts 2. Nairobi, East Africa.—C.E.P.B.

5H-108

551.541:551.558.21

Scorer, R. S., Pressure-fluctuations in mountain eddies. *Weather*, 8(11):343–345, Nov. 1953. s. DWB—Several quick-run barograph and thermograph records at Great Langdale, Westmoreland, on Jan. 31–Feb. 1, 1953, are illustrated, showing rapid fluctuations. The strong gusty wind as known by its sound to fluctuate in sympathy. The hygrograph showed no corresponding changes and the fluctuations are attributed to eddies caused by the mountains. (Same item as 5.3–207, March 1954, MAB.) Subject Headings: 1. Microbarometric oscillations 2. Eddies 3. Air flow over mountains.—C.E.P.B.

5H-109

551.558.1:551.576.11

Scorer, R. S., The spreading out of downdrafts. *Weather*, 8(7):198–201, July 1953. 3 figs. H-BH—Growth and decay of a CuNb cloud is illustrated. With rain, a downdraft of cold air currents which may reach the ground and become a shallow katabatic wind. Two cases from Guadarrama Mts. near Madrid are described with hygrogram and thermograms and glider experiences recounted. (Same item as 4.11–196, Nov. 1953, MAB.) Subject Headings: 1. Cumulonimbus clouds 2. Downdrafts 3. Guadarrama Mountains, Spain.—C.E.P.B.

5H-110

551.558.21

Scorer, R. S., Theory of airflow over mountains: II—The flow over a ridge. *Royal Meteorological Society, Quarterly Journal*, 79(339):70–83, Jan. 1953. 7 figs., 15 refs., 49 eqs. DWB—Types of flow defined are aerodynamic in statically neutral air near the ground, barostrophic in stably stratified air and geostrophic. The equations of flow over a ridge are formulated and the effect of varying degrees of stability in a uniform stream on vertical displacement illustrated. Flow oblique to the ridge leads to lateral displacement. The formation of trains of lee waves is discussed and their effect on tracks of balloons examined. Finally, the effects of vertical variations of stability and horizontal velocity on the amplitude of the disturbance at high levels are reviewed. For Pt. I which the fundamental equations for waves in the lee of mountains are derived, see *R. Met. Soc.*, J., 75:41, 1949. (Same item as 4.6–157, June 1953, MAB.) Subject Headings: 1. Lee waves 2. Orographic effects.—C.E.P.B.

5H-111

551.558.1

Scorer, Robert S., Waves across the Irish Sea. *Gliding*, London, 4(1):24–25, Spring 1953. a. a. a. photos. Slater, A. E., More Irish sea wave clouds. *Ibid.*, 26–27. diagrs. Sanders, A. A. J., Waves from Ulster to Kent. *Ibid.*, 27–28. DWB—Cloud formations over the sea are discussed and shown in photographs. Atmospheric conditions prevailing during wave formation are described. A case in which up to a hundred consecutive waves were observed is reported. (Same item as 5.1–209, Jan. 1954, MAB.) Subject Headings: 1. Thermals 2. Wave clouds 3. Irish Sea. Slater, A. E. II. Sanders, A. A. J.—G.T.

5H-112

551.558.1:797.5

Swinn, R. (*Egyptian Gliding School*), Standing waves over the Pyramids. *Gliding*, London, 1(1):4–6, Spring 1953. DWB—The author interprets the pyramid waves as part of two long chains of waves on either side of the Nile Valley, marking the temperature difference between the cultivated and the desert regions. Roll clouds are characteristic of these waves. A flight up to 5200 ft (top of the wave lift) is described and two cloud photographs presented. (Same item as 5.1–210, Jan. 1954, MAB.) Subject Headings: 1. Standing waves 2. Gliding 3. Wave clouds 4. Nile Valley, Egypt.—G.T.

5H-113

551.558.21 551.5:656.7

Zierep, J., Die Bestimmung der Leewellenströmung bei beliebigem Anströmprofil. [The determination of lee waves currents for any windward profiles.] *Zeitschrift für Flugwissenschaften*,

June 1953. 10 refs. Original unchecked.—Layer by layer calculation of approximately estimated lee-wave flow for any given ground velocity taking into account the kinematic and dynamic conditions. *Subject Headings:* 1. Lee effects 2. Air flow over mountains.

1954

5H-114

551.551:551.513.2:551.5

Clem, LeRoy H. (U. S. Weather Bureau). **High level clear air turbulence near the jet stream maxima.** Washington, D. C., U. S. Weather Bureau, 1954. 10 p. 13 figs., 9 refs. DWB—Paper emphasizes the association of the majority of high-level clear air turbulence with the pronounced vertical wind shear in and near the jet stream maxima. A physical model, based on an analogy drawn with similar low level phenomena studied by Woodcock (see 5H-30) and others, is proposed to explain the turbulence and associated cirrus bands and wind streaks in the jet maxima and the convective-like distribution of these features in the horizontal. *Subject Headings:* 1. Jet stream turbulence 2. Convection.—From author's abstract.

5H-115

551.541:551.558

Colson, DeVer (U. S. Weather Bureau). **Meteorological problems in forecasting mountain waves.** Wash., D. C., U. S. Weather Bureau, 1954. 6 p. 13 figs., 7 refs., eqs. Presented at American Meteorological Society Meeting, New York, Jan. 25-28, 1954. DWB—A review of what has been learned by the Weather Bureau "from study of the synoptic situations in connection with the Sierra Wave occurrences with references to the applicability of the rules to other areas." Investigation of the surface and 500 mb temperature and pressure pattern and tendency as well as of wind conditions (shear, jet stream) on days of wave activity indicates feasibility of forecasting wave. Vertical currents as high as 8000 ft/min cited. (See also 5H-55 above.) *Subject Headings:* 1. Air flow over mountains 2. Lee wave forecasting 3. Updrafts 4. Downdrafts 5. Sierra wave.—M.P.K.

5H-116

551.511:552

*Frenzen, Paul and Yoshinari, Nakagawa, **A theoretical and experimental study of cellular convection in rotating fluids.** Chicago. University. Department of Meteorology, Contract AF 19(122) 160, Scientific Report No. 5, April 1, 1954. 43 p. 18 figs., tables, 33 refs., 75 eqs., append. MH-BH—The stabilizing and cell shape changing influence of a basic rotation upon thermally produced cellular circulations are developed in a first order, "perturbation" theoretical possibility of a special "overstable" oscillating mode in certain fluids under the influence of rotation is recognized. The theory obtained for ordinary convection is compared to results obtained in laboratory experiments with rotating cylinders of water, and the existence of the "overstable" oscillating mode is demonstrated experimentally. Several possible applications of the theoretical results to atmospheric convection are developed by means of numerical examples, including models that are consistent with the observed association of deep convection with cyclonic relative vorticity and the distribution of clouds in regularly spaced clear and cloudy areas. *Subject Headings:* 1. Cellular convection 2. Fluid dynamics 3. Convection. I. Contract No. AF 19(122) 160 II. Chicago. University. Dept. of Meteorology.—Authors' abstract.

5H-117

551.558.21:7

Garrigue, Hubert. **De la possibilité de grandes performances d'un genre nouveau en vol à voile** [Possible record performance in a new type of soaring.] *Académie des Sciences, Paris, Comptes Rendus*, 238(2):264-266, Jan. 11, 1954. DWB—Conditions of large scale ascending currents observed in the Puy de Dôme region are described in connection with a flight in which an airplane having a height limit of 3,000 m was carried up to over 6,000 m. Still higher altitudes could be reached with sail planes constructed for stratospheric performance. *Subject Headings:* 1. Standing waves 2. Gliding 3. Updrafts 4. Puy-de-Dôme, France.—G.T.

5H-118

551.558.21:62

Harper, R. D. M., **Hill standing waves and safety heights.** *Weather*, 9(5):158, May 1954. DWB—Referring to article by D. MASON (see 5.5-152, May 1954, MAB) HARPER points out that it is more dangerous to fly upwind than downwind through a wave, and that height gained on upwind flight depends on ground speed. MASON's safety graph applies to upwind flight. *Subject Headings:* 1. Lee waves 2. Standing waves.—C.E.P.B.

5H-119

551.558.21:62

Kotsch, William J., **Nature's booby trap.** *Flying*, Chicago, 54(4):12-14, 46, 50, April 1954, photos., diagr. DWB—A cross section showing a typical mountain wave (up- and downdraft and cap, rotor, lenticular and mother-of-pearl clouds, turbulent areas) is presented. The mechanism of such waves is explained. Elements of danger to aircraft, signs of such danger observable in flight, and action to be taken in wave conditions are discussed. *Subject Headings:* 1. Standing waves 2. Lee waves 3. Aircraft operation 4. Flying weather.—G.T.

5H-120

551.558:551.515.41

Krumm, W. R. (*U. S. Weather Bureau, Missoula, Mont.*), **On the cause of downdrafts from dry understorms over the plateau area of the United States.** *American Meteorological Society, Bulletin*, (3):122-125, March 1954. 2 figs., 4 refs. **MH-BH**—Author presents examples and discusses the thermodynamics of "dry" thunderstorms to "illustrate how the results of BYERS and BRAHAM (see 5H-33 above) in Florida and Ohio may be extended to explain observed characteristics of understorms" in the Plateau Region where widespread air mass thunderstorms with cloud bases 14,000 to 16,000 ft develop in drier air than that typical of the East. Strong downdrafts (30-50 mph) in such storms are thought to occur when rain falls into the dry adiabatic environment below the cloud and evaporates, thus cooling the air below the cloud and increasing its density so it sinks, accelerating as it goes. *Subject Headings:* 1. Downdrafts 2. Thunderstorms 3. Thermodynamics of the atmosphere 4. Plateau region, U.S.A.—*M.P.K.*

SUPPLEMENTARY MATERIAL

5H-121

551.5:629.13(02) 551.558

Linke, Franz, **Aeronautische Meteorologie.** [Aeronautical meteorology.] Frankfurt a. M., Franz Benjamin Auffarth, 1911. 2 v. numerous figs., tables. **Vertical currents**, v. 1, p. 68-72. **Squalls**, v. 2, p. 80-94. **DWB**—In this classic textbook on aeronautical meteorology—the first of its kind—there are ten chapters, covering: I. general properties of the atmosphere, II. pressure, III. air movements, IV. temperature, V. moisture, VI. clouds, VII. stratification of air, VIII. forecasting and weather service, IX. squalls, thunderstorms and tornadoes, and X. optical phenomena. Chap. III, paragraph 6 discusses vertical motions in theory and the measurement of such winds with a vertical anemometer, which is illustrated. Vertical motion over hills, etc. are discussed in paragraph 7, and such motions in cumulus, thunderstorms and line squalls in Chap. IX. Aviation aspects are considered throughout, though based on limited experience with heavier-than-air craft. *Subject Headings:* 1. Aeronautical meteorology 2. Vertical motion 3. Textbooks.—*M.R.*

5H-122

551.554:797.5

Rainey, R. C., **Observations on the structure of convection currents: meteorological aspects of South African gliding flights.** *Royal Meteorological Society, Quarterly Journal*, 73:437-452, 1947. 2 figs., 4 tables, refs. **DWB**—Discussions of the upper limit of air currents during the early stages of convection, the vertical extent of orographic up-currents over a hill, the distribution of convective up-currents in relation to surface topography and wind structure and the vertical currents associated with a well-marked cold front. (Discussion in *Royal Meteorological Society, Quarterly Journal*, 73:173-178, 1948). *Subject Headings:* 1. Convection 2. Gliding 3. Updrafts 4. South Africa.—*P.K.*

5H-123

551.511

Sutton, O. G., **Convection in the atmosphere near the ground.** *Royal Meteorological Society, Quarterly Journal*, 74:13-30, Jan. 1948. 3 figs., 3 tables, 14 refs., 31 eqs. **DLC**—Aspects of problem of heat transfer in the lower atmosphere considered, in particular the general nature of flux of heat through the lower atmosphere on a clear summer day. Concluded that to explain such heat flow, the nature of vertical currents due to buoyancy and their effect on virtual coefficient of conduction must be considered. New theoretical treatment advanced. (*Same item as 4B-168*, Feb. 1953, *AB.*) *Subject Headings:* 1. Turbulent transfer of heat 2. Convection.—*H.P.K.*

5H-124

551.558:551.576.11

Harris, D. Lee, **On some assumptions often used in the study of atmospheric waves.** [Wash., D. C., U. S. Weather Bureau], Aug. 15, 1952. 35 p. 16 refs., 50 eqs. **DWB**—The Bjerknes perturbation equations are used to evaluate the justification for many of the most commonly used approximations of dynamic meteorology. It is shown that vertical wind shear, although often neglected, is usually an important term in the equations of motion, and that the assumption of an adiabatic lapse rate leads to a unique relation between frequency and wave length while the use of the actual lapse rate would lead to several eigenvalues of wave length which are function of the frequency. It is pointed out that the simple explanation of billow clouds given by many writers from HELMHOLTZ through HAURWITZ cannot be entirely correct, for it neglects the phenomena occurring in the shearing layer. It is shown that although the possibility of using the linearized perturbation equations to obtain an explanation for billow clouds is doubtful, it is not quite so hopeless as pictured by SEKERA (1948). The possibility is suggested that the true solution to many atmospheric wave phenomena may be found as an extension of the Gerstner wave solution rather than by using the linearized perturbation equations. *Subject Headings:* 1. Atmospheric waves 2. Billow clouds 3. Vertical motion.—*Author's abstract.*

5H-125

†Corby, G. A., **The airflow over mountains. A report on the state of current knowledge.** *Great Britain, Meteorological Research Committee, M.R.P.*, No. 842, Dec. 31, 1953. 35 p. 6 figs., 24 e. Mimeo. **GB-MO**—In Pt. 1 of this exhaustive report, the observational evidence of airflow over mountains, notably lee waves, is summarized. It includes mountain clouds, especially stationary lenticular clouds and rotors, and experiences of pilots of gliders and powered aircraft. Pt. 2 summarizes (with standardized notation), discusses and generalizes the theoretical studies of QUENLYRA and SCORER; fundamental importance is attributed to the magnitude l^2 . The various assumptions involved in the theories are reviewed. In Pt. 3 model experiments by ABE, LONG, and others, including the Gibraltar investigation, are critically discussed. Pt. 4 takes up the gliding studies of J. FÖRCHTGOTT in mountain regions and his consistent theories of types of flow. Final applications to aviation forecasting and criteria of safety heights are considered. *Subject Headings*: 1. Airflow over mountains 2. Lee eddies. 1. Förichtgott, J.—*C.E.P.B.*

5H-126

551.558.21 551.513.2:551.557

§Georgii, Walter, **Problemas de la corriente ondulatoria y de chorro en la Argentina.** [Problem of the air current and the jet stream in Argentina.] *Revista Nacional de Aeronautica*, Buenos Aires 13(131):33-37, Feb. 1953. 16 figs. Also: **La corriente atmosférica de chorro.** [The atmospheric jet stream.] *Ibid.*, 13(132):42-45, March 1953. 14 figs. **DWB**—Informative articles on the vertical structure of air currents over and to the lee of the Andes and on the structure of the jet stream, based on airplane and glider soundings and schematic diagrams illustrating conditions in Argentina. The cloud formations as well as wind currents in the several lee waves are illustrated and shown in photographs and the synoptic conditions shown by Argentine weather maps. Discussion of the jet stream is mainly in connection with its influence on currents over the Argentine region. (Same item as 5.7-128, July 1954, *MAB.*) *Subject Headings*: 1. Lee waves 2. Jet stream 3. Aeronautical meteorology 4. Gliding 5. Argentina.—*M.R.*

5H-127

551.51

Scorer, R. S. and Ludlam, Frank H., **Bubble theory of penetrative convection.** *Royal Meteorological Society, Quarterly Journal*, 79(339):94-103, Jan. 1953. 6 figs., 10 refs., 5 eqs. **DWB**—Penetrative convection in which air rises through a large environment is studied as an intermittent jet rising as bubbles from a localized source. A bubble sheds its outer skin into a disturbed wake until it disappears; in the wake the ascent of further bubbles is facilitated. Above the bubble the air is lifted and cooled and drains down outside. Bubble structure is illustrated by photographs of smoke. The limiting velocity of a cumulus tower is calculated from its buoyancy and agrees with observations. Transport of heat upwards occurs mainly by aggregation of small bubbles into large. (Same item as 4.6-156, June 1953, *MAB.*) *Subject Headings*: 1. Bubble theory 2. Entrainment.—*C.E.P.B.*

5H-128

551.501.81:551.51

Wexler, Raymond, **Radar echoes from a growling thunderstorm.** *Journal of Meteorology*, 10(4):285-290, Aug. 1953. 3 figs., 5 tables, 13 refs., 4 eqs. **MH-BH**—A theoretical expression is obtained for rate of growth of an ice sphere. Hail trajectories in various updrafts are computed. Minimum hail diameters, of various concentrations, detectable by radar at 25 km, and temperatures of first radar echo with various updrafts are calculated. Four conclusions about behavior of radar echo are set out. With an updraft of 3 m/s first echo occurs at -8 to -11°C . This and subsequent extension of the echo are in good agreement with the observations of E. J. WORKMAN and S. REYNOLDS (1949) in New Mexico. (Same item as 5.5-33, May 1954, *MAB.*) *Subject Headings*: 1. Radar echoes 2. Thunderstorm dynamics.—*C.E.P.B.*

5H-129

551.551:551.55

Jones, D. C. E., **Note on exceptionally severe clear-air turbulence and other phenomena.** *14th April, 1954. Great Britain, Meteorological Research Committee, M.R.P.*, No. 868, June 9, 1954. 4 p. 3 figs., table, 2 refs. Mimeo. **GB-MO**—Turbulence severe enough to turn aircraft upside down was met at 40,000 ft in a strong N.W. current near Edinburgh; it ceased below 38,000 ft. It was in the upper troposphere in pronounced vertical and horizontal wind shear on the warm side of the jet stream above the axis. On the same day many standing waves were reported at 45,000 ft over England. *Subject Heading*: 1. Clear air turbulence.—*C.E.P.B.*

5H-130

551.55

Scorer, R. S., **Bubble convection.** *Meteorological Magazine*, London, 83(985):202-208, 1954. 2 figs., table, 5 refs. **MH-BH**—The process of release of a bubble from the superadiabatic layer over a varied countryside and the ascent of an eroding bubble with a turbulent wake are shown by sketches. The wake favors formation of successive larger bubbles. Growth processes are described and the system of bubble convection over land from surface to over 3000 ft tabulated (sub-cloud layer, stable sub-cloud layer, cloud layer). *Subject Heading*: 1. Convective activity.—*C.E.P.B.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section are for information only, and will not be listed in the monthly indexes until abstracted. When material is furnished in advance of date of publication, the pagination may be omitted.

American Geophysical Union, Transactions, Volume 35, Number 3, June 1954.

- Gladden, Sanford C.: Procedures used to improve the quality of ionospheric data, p. 398-404.
Coffin, James C.: A method of estimating precipitation normals for short-record stations, p. 405-412.
Brooks, Edward M.: Characteristics of thunderstorm microbarograms, p. 413-419.
O'Hare, J. E.; Carlson, Q. H. and Tamblyn, W. E.: Some results of a tanker survey of the Gulf Stream, p. 420-430.
Hidaka, Koji: A contribution to the theory of upwelling and coastal currents, p. 431-444.
Irmay, S.: On the hydraulic conductivity of unsaturated soils, p. 463-467.
Helmert, Austin E.: Precipitation measurements on wind-swept slopes, p. 471-474.
Gerdel, R. W.: The transmission of water through snow, p. 475-485.
Grant, Arthur S. G.: Notes on the atmospheric refractive index in Canada from aircraft meteorological soundings, p. 508-510.

American Meteorological Society, Bulletin, Volume 35, Number 4, April 1954.

- Endlich, R. M.; Harney, Patrick; McLean, G. C.; Rados, Robert M.; Tibbets, O. J. and Widger, W. K., Jr.: Project jet stream. The observation and analysis of the detailed structure of the atmosphere near the tropopause, p. 143-153.
Fawbush, Ernest J. and Miller, Robert C.: The types of airmasses in which North American tornadoes form, p. 154-165.
Means, Lynn L.: A study of the mean southerly wind-maximum in low levels associated with a period of summer precipitation in the Middle West, p. 166-170.
Elliott, Robert D. and Strickler, Robert F.: Analysis of results of a group of cloud seeding projects in Pacific Slope watershed areas, p. 171-179.
Gunn, Ross and Allee, Paul A.: A three thousand cubic meter cloud chamber, p. 180-181.

Number 5, May 1954.

- Reber, Carl M.: The South Plate Valley tornadoes of June 7, 1953, p. 191-197.
Fobes, Charles B.: Continentality in New England, p. 197, 207.
Duckworth, Fowler S. and Sandberg, James S.: The effect of cities upon horizontal and vertical temperature gradients, p. 198-207.
Mintz, Yale: The observed zonal circulation of the atmosphere, p. 208-214.
Gilman, C. S.: Suggestions for a coordinated program to study differential advection as a "Predictor" for precipitation and other meteorological features, p. 214.
Ehrlich, Albert: Synoptic patterns associated with singularities in the Northeastern Atlantic, p. 215-219.
Sherman, L. and Carino, I.: A note on hurricane Able of 1952, p. 220-222.
Appleman, H.: Design of a cloud-phase chart, p. 223-225.
Morris, Vernon B. and Sobel, Frederick: Some experiments on the speed of response of the electrolytic hygrometer, p. 226-229.
Schaeffer, Vincent J.: The measurement of high concentrations of ice nuclei in a small parcel of air, p. 230-233.

Verhandte Meteorologie, Berlin, Volume 2, Number 2, May 1954.

- Hentschel, G.: Untersuchungen über eine allgemeine Verwendungsmöglichkeit des Kernzahlers zur Bestimmung der Art des atmosphärischen Aerosols und der Grösse seiner Partikel, [Investigations of the general applicability of the nuclei counter for determining the type of atmospheric aerosol and the size of its particles], p. 33-47.

Morgen, A.: Zur Erfassung der witterungsbedingten Schwankungen bei der Pflanzenproduktion. Fünf Jahre Vegetationsüberwachung in Trier, [On variations in plant production caused by weather. Five years observation at Treves], p. 48-58.

Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A, Volume 7, 1954.

Sutcliffe, R. C.: Predictability in meteorology, p. 3-15.

Van Mieghem, J.: La forme rotationnelle des équations de la dynamique atmosphérique invariants du mouvement de l'air, [Rotational form of dynamic equations of the atmosphere and the invariables of atmospheric motion], p. 16-28.

Platzman, G. W.: The computational stability of boundary conditions in numerical integration of the vorticity equation, p. 29-39.

Bjerknes, J.: The diffluent upper trough, p. 40-46.

Raethjen, P.: Dynamische Zyklagenese, [Dynamic cyclogenesis], p. 47-55.

Riehl, H.: Jet stream flight, March 23, 1953, p. 56-66.

Koschmieder, H.: Die Isobarenbrechung an Luftmassengrenzen, [Isobaric refraction at mass boundaries], p. 67-79.

Palmén, E.: On the relationship between meridional eddy transfer of angular momentum and meridional circulations in the earth's atmosphere, p. 80-84.

Flohn, H. and Trenkle, H.: Zur Kenntnis des atmosphärischen Meridionalaustausches, [On the knowledge of atmospheric meridional exchange], p. 85-98.

Nyberg, A.: Meridional heat transport on a part of the Northern Hemisphere in November 1949, and February 1950, p. 99-113.

Sheppard, P. A.: The vertical transfer of momentum in the general circulation, p. 114-120.

Montgomery, R. B.: Convection of heat, p. 125-132.

Lettau, Heinz: A study of the mass, momentum and energy budget of the atmosphere, p. 133-157.

Möller, F.: Ein Kurzverfahren zur Bestimmung der langwelligen Ausstrahlung dicker atmosphärischer Schichten, [A practical method for determining the long wave radiation of thick atmospheric layers], p. 158-169.

Kuhlbrodt, E.: Schichtung der Hauptluftströmungen über dem atlantischen Gebiet 5°S bis 9°S, 10°W bis 5°E, [Stratification of the main air currents over the Atlantic Region from 5°S to 9°S, 10°W to 5°E], p. 170-187.

Baur, Franz: Die Bestätigung bisheriger Ergebnisse der Grosswetterforschung durch den Winter 1953/54, [The confirmation of previous results of large scale weather investigation by winter 1953/54], p. 188-198.

Fuchs, J.: Der 12 Tage-Rhythmus im europäischen Grosswetter, [The 12-day rhythm in European weather], p. 199-218.

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